

ANALYSIS
OF DRAFT ENVIRONMENTAL IMPACT STATEMENT
REGARDING "PROPOSED INCREASE IN
ACREAGE TO BE OFFERED FOR OIL AND
GAS LEASING ON THE OUTER CONTINENTAL SHELF"

Presented on Behalf of the Southern California Council
of Local Governments Concerned with the Federal
Proposal for Accelerated OCS Oil & Gas Development

*Environmental impact studies
Conservation
Ind. Petroleum
Air pollution
water treatment*

Prepared and Submitted on Behalf
of the Southern California Council
of Local Governments

By

INSTITUTE OF GOVERNMENTAL
STUDIES

JAN 28 1977

UNIVERSITY OF CALIFORNIA

TOM BRADLEY, Mayor
City of Los Angeles

BURT PINES, City Attorney
City of Los Angeles

City Hall
Los Angeles, California 90012
(213) 485-5407

February, 1975



Digitized by the Internet Archive
in 2025 with funding from
State of California and California State Library

<https://archive.org/details/C101742082>

**ANALYSIS
OF DRAFT ENVIRONMENTAL IMPACT STATEMENT
REGARDING "PROPOSED INCREASE IN
ACREAGE TO BE OFFERED FOR OIL AND
GAS LEASING ON THE OUTER CONTINENTAL SHELF"**

**Presented on Behalf of the Southern California Council
of Local Governments Concerned With The Federal
Proposal for Accelerated OCS Oil & Gas Development**

**Prepared and Submitted on Behalf of the
Southern California Council of Local Governments**

By

TOM BRADLEY, Mayor

BURT PINES, City Attorney

Staff:

Staff:

**Norman Emerson
Graham Smith**

**Jan Chatten-Brown
Gail Gordon
Tim Hogan
Ginger Lew
John McDermott**

With the assistance of:

**Michael Alcantar
Gary Kovacic
John Missirlian
Royner Sanchez
Ron Skocypec**

THE SOUTHERN CALIFORNIA COUNCIL
OF LOCAL GOVERNMENTS CONCERNED WITH
THE FEDERAL GOVERNMENT'S PROPOSAL FOR
ACCELERATED OCS OIL & GAS DEVELOPMENT

The Southern California Council of Local Governments Concerned with the Federal Proposal for Accelerated OCS Oil & Gas Development was formed by a group of Mayors, Councilpersons and other governmental officials. The purpose of this Council was to discuss the proposals of the Department of the Interior in regard to expanded OCS development.

The members of the Council, each of which intend to testify as part of the testimony presented by the Council at the hearings, include:

City of Los Angeles
City of San Diego
County of San Diego
City of Beverly Hills
City of Santa Monica
City of Santa Barbara
County of Santa Barbara
City of Riverside
City of Newport Beach
City of Torrance
City of Palos Verdes Estates

City of Rancho Palos Verdes

City of Laguna Beach

County of Orange

City of Huntington Beach

Southern California Association of
Governments

Due to the press of time, this Analysis could not be fully circulated to all members of the Council to receive formal ratification. As of the date of printing, however, the following jurisdictions have formally authorized submission of this Analysis on behalf of their jurisdictions:

City of Los Angeles

City of San Diego

City of Santa Monica

City of Riverside

City of Torrance

City of Palos Verdes Estates

City of Laguna Beach

County of San Diego

TABLE OF CONTENTS

Section I

LEGAL ANALYSIS

TITLE PAGE	i
SUMMARY OF THE ANALYSIS	1-22
I STATEMENT OF INTEREST	23
II THE REQUIREMENTS FOR A LEGALLY ADEQUATE E.I.S.	24-37
III INADEQUACIES OF THE E.I.S.	38
A. Development as an Integral Part of a National Energy Policy	38-39
B. The Need for O.C.S. Development Has Not Been Adequately Demonstrated	40-45
C. The Conservation Alternative	46-117
D. Exploration of Other Energy Alternatives	118-129
E. Production of Shut-In Wells and Secondary and Tertiary Recovery As Alternatives to Expand O.C.S. Development	130-143
F. National Naval Petroleum Reserves: The Elk Hills Example	144-147
G. O.C.S. Development Cannot Be Undertaken Within the Proposed Time Frame	148-154
H. Mitigation Measures Not Adequately Considered	155-160
I. Failure to Consider Relative Environmental Effects	161-171
J. Degradation of Air Quality	172-178
K. Insufficient Data For Environmental Analysis	179-207
L. The Onshore Land Use Impacts of O.C.S. Development	208-219

M.	The Lessons of Santa Barbara	220-238
N.	Diminution of Land Values	239-255
O.	Lack of Compensation to Local Government for Losses Associated With O.C.S. Development	256-273
IV	AN ECONOMIC ANALYSIS OF THE FEDERAL LEASING SYSTEM	274-306
V	PROCEDURES OF EVALUATION	
A.	Limitations on Public Participation	307-317
B.	The Leasing Process and the Department of Defense	318-327
VI	EVIDENCE THAT THE DETERMINATION HAS BEEN MADE AND PROCEDURES RESULTING IN A PRE- DISPOSITION TO DRILL	328-349
VII	THE COASTAL ZONE MANAGEMENT ACT	350-359
VII	CONCLUSION	360-362

Section II

SCIENTIFIC ADVISORY COMMITTEE REPORTS

MEMBERS OF THE SCIENTIFIC ADVISORY COMMITTEE		1
I	AIR QUALITY	
	Dr. Richard L. Perrine	1
	Dr. Alan C. Lloyd	8
II	MARINE BIOLOGY	
	Invertebrates	
	Dr. Malcolm S. Gordon	11
	Dr. James G. Morin	31
	Vertebrates	
	Dr. Malcolm S. Gordon	48
III	MARINE BOTANY	
	Dr. David J. Chapman	66

IV	CHEMICAL OCEANOGRAPHY	
	Dr. I.R. Kaplan	78
V	SEISMICITY	
	Dr. Tom L. Henyey	88
	Dr. Robert L. Kovach	101
VI	MANPOWER AND MATERIAL SHORTAGES	
	Dr. L.L. Handy	109
VII	ENHANCED RECOVERY	
	Dr. Richard Perrine	121
VIII	Comments by Robert Sharp	125

Section III

SCIENTIFIC ADVISORY COMMITTEE REPORTS - SAN DIEGO

I	"Potential Economic Impacts of Offshore Drilling on the California Coast" by Dr. Richard Emerson, Professor Economics, University of California at San Diego	1
II	Comments by Dr. Gerhard Wolter, Professor of Physics, San Diego State University	7
III	Comments by Dr. Richard Eppley, Biologist, Scripps Institute of Oceanography, La Jolla	17

APPENDIX

SECTION I

LEGAL ANALYSIS

Summary of Analysis of Draft Environmental
Statement Regarding "Proposed Increase in
Acreage to be Offered for Oil and Gas Leasing
on the Outer Continental Shelf"

The following is a summary of the detailed Analysis of the Draft Programmatic E.I.S. on expanded Outer Continental Shelf (O.C.S.) Drilling prepared by the Bureau of Land Management (B.L.M.). This Analysis has been prepared by and on behalf of the Council of Local Governments Concerned with O.C.S. Development, for presentation to B.L.M. as a portion of the comment and input to be given by the participating jurisdictions during the public hearing and review process.

The Analysis is based upon a comprehensive review of the E.I.S., the Project Independence Blueprint, and over sixty major documents dealing with energy and O.C.S. development. Included in the Analysis is a critique of the E.I.S. prepared by the Scientific Advisory Committee. That Committee was formed, at the request of the Council, to advise the participating jurisdictions as to the accuracy of the data included in the E.I.S., the additional data which should be provided, the additional scientific studies which should be undertaken, and related matters.

I. REQUIREMENTS FOR LEGALLY ADEQUATE E.I.S.

The specific requirements regulating the nature and content of the Draft E.I.S. are set forth and established by the National Environmental Policy Act (N.E.P.A.), the Guidelines for Implementation of N.E.P.A. promulgated by the President's Council on Environmental Quality (C.E.Q.), and by the case law interpreting these foregoing provisions. Having carefully reviewed the draft E.I.S. in light of these legal requirements, we have concluded that the draft E.I.S. is seriously inadequate and fails to fulfill the legal mandate that it set forth a "detailed statement of the environmental impact of a project and the project's alternatives."

Specifically, the E.I.S. fails to:

- (1) Adequately discuss the relationship between the proposed O.C.S. development and the establishment of a comprehensive national energy policy, with proper reference to the Project Independence Blueprint, as required by law;
- (2) Adequately discuss our principal energy alternatives, including most importantly the alternative of energy conservation;
- (3) Develop the data on marine resources necessary to an intelligent analysis of the impact of O.C.S. development upon those resources;

- (4) Provide a detailed analysis of the primary, secondary, and cumulative effects of O.C.S. development, supported by empirical data or scientific authorities; and
- (5) Address the numerous major issues discussed in this Analysis.

II. INADEQUACIES OF THE E.I.S.

A. O.C.S. Development as an Integral Part of a National Energy Policy:

Any decision made in regard to O.C.S. development clearly must be made in the context of a comprehensive national energy policy. In that regard, the adequacy of the E.I.S. is severely impaired due to the fact that its completion preceded release of the Project Independence Blueprint. The failure of the E.I.S. to fully consider and weigh the alternatives suggested in the Project Independence Blueprint, and the failure of the E.I.S. to clearly measure the proposed O.C.S. development program in the context of a national energy program, is violative of both the spirit and express requirements of the law.

B. The Need for O.C.S. Development Has Not Been Adequately Demonstrated:

The E.I.S. only refers to the demand projections of the National Petroleum Council, the Ford Foundation Energy Report, and Department of the Interior's own demand projections. There is no reference to the Project Independence Blueprint demand projections. Further, the Department of the Interior's own projections of a 2% to 3% increase in energy growth over the next 25 years is little more than a rough guess of what future energy demands might be. It does not provide a valid basis for a decision regarding greatly expanded O.C.S. development.

We submit that the most useful demand projections are those in the Ford Foundation Energy Report. This Report projects three different scenarios: (1) a historical growth scenario, (2) a technical fix scenario, and (3) a zero energy growth scenario. Even under the historical growth scenario of a 3.4% energy growth rate, the greatly accelerated O.C.S. program now being contemplated by the Interior would not be necessary. Additionally, under either the technical fix scenario or the zero energy growth scenario, O.C.S. development would not be necessary in the time frame now being considered.

The Project Independence Blueprint, which the draft E.I.S. fails to consider, assumes that there will be no significant O.C.S. development in the Pacific, Atlantic or Gulf of Alaska areas. Moreover, a report from the House Committee on

Interior and Insular Affairs, entitled The Trans-Alaska Pipeline and West Coast Petroleum Supply, 1977-1982, indicates that there will be a surplus of petroleum supplies during the period 1977-1982 in the Pacific region. These factors must be considered by the Department of Interior in making any decision to lease in the Pacific, Atlantic, or Gulf of Alaska.

C. The Alternative of Energy Conservation

A mandatory energy conservation program offers a viable alternative to accelerated O.C.S. development. This alternative was not adequately evaluated by the E.I.S.

Accelerated development of all our energy sources will still not meet unrestrained demand. Economic as well as environmental factors mandate that we adopt a strong energy conservation plan. We suggest that serious consideration must be given in the E.I.S. to the following energy conservation alternatives discussed at much greater length in the Analysis:

1. Transportation

The Project Independence Blueprint suggests a number of means to greatly increase use of public transit, thereby reducing our national dependence upon the automobile. Additionally, it has been suggested that tax incentives should be developed to encourage automakers to produce more energy efficient cars which are lighter, and have better aerodynamic designs. A tax might be levied on cars not meeting improved fuel economy standards.

2. Building and Urban Design Proposals

Space conditioning presently accounts for more than 60% of residential energy use. This use can be substantially reduced by requiring better insulation and by modifying building design. The nation's building codes must be updated. The Federal Housing Authority should revise their standards for issuing loans by requiring a life-cycle cost for building designs. Subsidies and guaranteed loans should be provided so that lower income families can increase the energy efficiency of their homes. Over the life-cycle of a house, the cost of improving the energy efficiency of the structure is far outweighed by savings on fuel costs. There are numerous tax incentive programs which can be suggested to improve construction practices.

3. Industry

Industry consumption accounts for 33% of the total U.S. energy demand. Energy efficiency can be increased in almost all industries by implementing a program designed to promote:

(a) better maintenance of existing equipment; (b) recovery of process heat losses; (c) modifying product specifications to minimize consumption patterns; (d) shifting from use of raw materials which require high energy consumption; (e) using natural fertilizers as substitutes for petroleum and natural gas intensive fertilizers; and (f) using recycled materials.

4. Natural Gas

Continuous use of gas pilot-lights is responsible for consumption of an estimated 223-billion cubic feet of gas annually in the United States. A long-range cost/benefit analysis to the consumer indicates that substituting electric starters for gas pilots is economically justified and would result in substantial energy savings.

5. Lighting

Lighting accounts for 25% of U.S. electricity consumption. Much of that is used wastefully in decorative or advertising lighting or as a result of over-illumination and should be more stringently regulated.

6. Heating, Cooling and Ventilating Systems

Approximately 18% of the total national energy consumption is for heating buildings. Much of the energy used in adjusting internal temperatures would not be necessary if buildings were properly insulated and designed. Energy consumption in buildings may be reduced by: (a) use of solar or solar-assisted heating and cooling; (b) heat pumps; (c) rockbed regenerators; and (d) by adopting building codes requiring energy-conserving techniques.

7. Research and Development:

Our nation has failed to make a reasonable allocation of research and development funds between our various energy alternatives, including conservation. Substantial funds should be allotted for development of: (a) heat transfer technology; (b) low temperature heat applications; (c) energy savings in space conditioning; (d) industrial steam production technology; (e) integrated power generation; (f) improvements in efficiency of power generation; and (g) new manufacturing processes.

In summary, the Analysis points out that the E.I.S. completely fails to consider one of the principal alternatives to O.C.S. development -- a mandatory national energy conservation program. The experience of the City of Los Angeles during last Fall's energy crisis proves the value of mandatory energy conservation programs. During the winter of 1973-74, the City of Los Angeles implemented a plan which resulted in a 17% reduction in energy use during the first two months the program was in effect. A study of the results of that plan by Rand Corporation indicates that: (1) lighting changes accounted for most of the reduced use; (2) most business establishments regarded 20% as a reasonable amount to cut without adverse consequences to business; and (3) most businesses are continuing to maintain the reductions they made during that period. The Analysis concludes that with economically and technologically feasible energy conservation practices, our energy growth rate can easily be reduced to 2% annually, and even zero energy growth is possible. Unfortunately,

the E.I.S. fails to give this alternative the serious attention it warrants.

D. Other Energy Alternatives:

The E.I.S. discusses several suggested energy alternatives to O.C.S. drilling. However, the treatment of those discussed is clearly inadequate, while other significant alternatives are simply not discussed.

Among the alternatives cursorily examined in the E.I.S. and which are treated at much greater length in this Analysis are solar, geothermal, nuclear, oil shale, hydroelectric and oil importation. The alternatives not discussed in the E.I.S., but considered in this Analysis include bio-energy, wind, and secondary and tertiary recovery from existing wells. Bio-energy we especially feel is advantageous because it supplies energy while solving solid waste management problems. Secondary and tertiary recovery are also sound resource management tools which deserve greater attention. In summary, the treatment of other energy alternatives in the E.I.S. is seriously deficient.

E. Production of Shut-In Wells and Secondary and Tertiary Recovery as Alternatives to Expanded O.C.S. Development:

No mention in the E.I.S. is made of the alternatives to O.C.S. development of production of wells now apparently "shut-in" in the Gulf of Mexico, nor is there an adequate consideration

of the alternative of secondary and tertiary recovery from existing wells. The House Sub-Committee on Regulatory Agencies has found that a substantial number of tracts capable of production in the Gulf of Mexico have been classified as shut-ins by the U.S. Geological Survey upon the request of oil and gas companies. The Federal Power Commission has made similar findings regarding the production capacity of oil and gas fields. The question is whether or not classification of a tract as shut-in is appropriate. Substantial evidence seems to indicate that in many cases it is not.

The House Sub-Committee has found that the Department of the Interior has not demonstrated its capacity to efficiently administer the present leasing system. If this is true, what is the justification for greatly accelerated O.C.S. development under the same regulatory system? Whether shut-ins are the result of inadequate manpower and materials, or a desire of the oil companies to develop the areas in the future when prices are higher, the fact remains that the nation appears to have presently leased areas capable of production which are not now producing.

The same concern is applicable to the failure of the E.I.S. adequately to discuss the production capacity which would result in secondary and tertiary recovery. Such recovery is not being undertaken at this time because the oil companies apparently do not find it to be economically attractive. Nonetheless, these national resources which have already been tapped should not be left partially developed if they can be fully developed in an environmentally and economically sound manner.

F. The Elk Hills Example of Present Onshore Potential

The E.I.S. entirely ignores one of the most feasible alternatives to accelerated O.C.S. development, that is the tapping of existing onshore petroleum reserves held by the military. One particular example not even mentioned in the E.I.S. is the Elk Hills Naval Petroleum Reserve. Within 18 months, 230,000 barrels-a-day could be produced from Elk Hills, with maximum production of 350,000 barrels-a-day being reached within 3 years -- well ahead of what can reasonably be anticipated from newly leased O.C.S. areas.

The cost of developing Elk Hills, as opposed to O.C.S. development cost, is dramatic. While offshore wells cost approximately \$2 million each to drill, with offshore platforms costing \$200 million each, onshore wells drilled at Elk Hills would cost approximately \$250,000 each.

Substantial evidence indicates that the Elk Hills Naval Reserve is not necessary for national defense. The President has now indicated that he supports opening this Naval Reserve for domestic consumption. Clearly, it is an example of a meaningful onshore alternative which should have been discussed in the E.I.S.

G. Substantial Evidence Indicates that O.C.S. Development Cannot be Undertaken Within the Time-Frame Proposed

The E.I.S. only superficially discusses the serious problem of the ability of the oil industry to keep production abreast with the proposed increase in leasing due to the major

shortages of drilling rigs, equipment and skilled manpower. The findings of two major federal Congressional reports, and the Blueprint for Project Independence, convincingly demonstrates that the leases now proposed for development could not be developed within the proposed time-frame. Further, both the report of the Ad Hoc Committee on the Domestic and International Monetary Effect of Energy and Other National Resources Pricing of the House Banking and Currency Committee, and the report from the National Oceans Policy Study on Outer Continental Shelf Oil and Gas Development in the Coastal Zones, raise serious questions about the viability of accelerated O.C.S. leasing in light of current shortages of equipment, construction materials, and trained personnel. The Project Independence Blueprint indicates that shortages in drilling rigs, tubular goods, and walking draglines cannot be overcome in the short-run period. Even a technical paper released by the Department of the Interior indicates a severe shortage of these necessary materials. In summary, the E.I.S. fails to deal with this significant issue, that is whether accelerated O.C.S. development is in fact a meaningful solution or viable alternative.

H. Mitigation Measures Not Adequately Considered

The E.I.S. fails to consider measures which would mitigate the potential adverse environmental effects of O.C.S. development. The E.I.S. should at the very least consider the following possible mitigation measures:

1. Immediate exploration of the potential lease areas so we would know what is in fact available;

2. Establishing a priority system so that lease sales would first take place in the areas farthest offshore with the least potential environmental impacts;
3. Camouflaging rigs to preserve aesthetic values;
4. Requiring subsea completion of wells to preserve aesthetic values, and reduce navigational obstructions;
5. Establish more stringent drilling and production regulations.

I. Failure to Consider Relative Environmental Impacts

The relative environmental impacts of drilling throughout the O.C.S. must be evaluated prior to any further lease sales. This evaluation was not provided for by the E.I.S.

A report entitled O.C.S. Oil and Gas - An Environmental Assessment, prepared by the President's Council on Environmental Quality, demonstrates that such an analysis is possible. Although limited to the Atlantic coast and the Gulf of Alaska, the C.E.Q. report resulted in a rating of various possible development areas according to environmental sensitivity and resource potential. Southern California has certain unique resources, as do other areas, and efforts must be made to evaluate the impact of O.C.S. development on those resources. In summary, in order for the E.I.S. to be legally adequate, it is submitted that the relative environmental impacts of drilling in various areas throughout the O.C.S. must be developed and discussed.

J. Insufficient Data for Environmental Analysis:

The E.I.S. is replete with admissions that sufficient data is not available regarding marine and coastal resources or the impact of O.C.S. development on those resources. The E.I.S. includes nineteen such major admissions of lack of data. Even though the drafters of this Analysis had extremely limited time and personnel, in all but five of the specific areas involved, we found literature sources providing the necessary analysis. In those areas where data is not now available, the Department of the Interior has an affirmative obligation to develop the necessary data.

One example of the need for additional data is provided by the report of the Southern California Academy of Sciences. This group is presently under contract with the Bureau of Land Management to provide baseline data on the Southern California marine resources. Although the Department of the Interior contends that this baseline data is only needed for monitoring of O.C.S. development, rather than for making the determination as to whether there should be such development in the first instance, it is important to note those specific areas where the scientific community believes additional data is necessary. Thus, the Southern California Academy of Sciences concluded:

1. Geological oceanography, especially in regard to seismic activities off Southern California, is inadequate. Recommendations for numerous studies were made.

2. Additional studies of vertebrate and invertebrate populations, habitats and sensitivity to oil pollution need to be studied.
3. A better understanding of physical oceanography, including oceanographic and surface meteorology, is needed.
4. A better understanding of chemical oceanography is needed.

K. Degradation of Air Quality:

The E.I.S. only provides a discussion of possible degradation of air quality in terms of the result of evaporation from oil spills. N.E.P.A., however, requires a discussion of both the primary and the secondary impact of a project. Obviously, the onshore activity which is the consequence of O.C.S. development will have a substantial adverse effect on air quality.

Increased refinery capacity and operation will clearly result in substantial increases in sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide and hydrocarbons. The air quality in Southern California is far from reaching primary ambient air quality standards set pursuant to the Federal Clean Air Act. Further degradation in air quality will result from increased refinery capacity. This issue should be fully addressed by the E.I.S.

L. The Onshore Land Use Impacts of O.C.S. Development:

The discussion of onshore impacts within the E.I.S. is wholly inadequate. Among the more notable onshore activities having significant primary land-use impacts are the following: (1) harbor and dock facilities; (2) equipment storing areas; (3) pipeline terminals and corridors; (4) tank farms and transportation facilities; and (5) refinery, petrochemical complexes, and supporting construction industries. The potential of these facilities for conflicting with other land-use values, and the resulting environmental impacts, must be fully discussed and considered by the E.I.S.

M. The Santa Barbara Oil Spill -- An Impact Never

Discussed:

The E.I.S. never discusses the Santa Barbara oil spill, despite the fact that it is an incident that exemplifies many of the economic and environmental consequences of O.C.S. development. The 1969 blowout from a major channel platform was the result of poor operating procedures and government regulations. Over 3,250,000 gallons of oil spilled into the ocean, resulting in a slick of over a thousand square miles. Over 80 miles of coastline were contaminated. Containment and recovery efforts were woefully inadequate.

Although long-term effects of the Santa Barbara spill on the marine and coastal environment are difficult to estimate,

they clearly are substantial. As to short term damages, the cost of replacing dead organisms has been estimated to be over \$10 million. Over \$10 million was spent by the oil companies for control and cleanup, and approximately \$640,000 by governmental agencies' post spill operations. Indirect costs of the spill include diminution of property values and loss of tax revenues. Short term loss to the commercial fishing industry was over \$800,000. Loss in recreational value has been estimated to be over \$3 million.

The E.I.S. makes no attempt to estimate these very real costs which may result from O.C.S. development, nor is the entire subject of potential impacts from spills or accidents meaningfully developed.

N. Diminution of Property Values

The E.I.S. fails to discuss the diminution of property values that will result from O.C.S. development. The potential adverse impact upon land values of the aesthetic blight of platforms and potential for oil spills is well demonstrated by the Santa Barbara case. Total diminution of property values resulting from the Santa Barbara oil spill ranged from a total of \$6,885,000 to a high of \$8,934,000. Potential adverse impacts of these magnitudes must be discussed by the E.I.S.

O. Economic and Resource Losses to State and Local Governments Resulting From O.C.S. Development

The E.I.S. does not discuss possible adverse economic consequences to local governments resulting from O.C.S. development, nor does the E.I.S. discuss the loss to the public of visual amenities, beach and marine resources and recreational values. Studies from both Louisiana and Texas indicate that local government, in providing services to O.C.S.-related developments, bear substantial economic burdens. The public at the same time suffers a substantial loss of its beach and marine resources.

III. ECONOMIC ANALYSIS OF THE FEDERAL LEASING SYSTEM

The E.I.S. entirely fails to consider the relative economic merits of alternative leasing systems. This is contrary to the mandate of N.E.P.A. that environmental as well as economic and technical cost benefits analyses must be prepared. With the exception of one trial royalty-fixed cash bonus system, the federal government is now operating under a cash bonus-fixed royalty system which combines an initial substantial cash payment with a fixed royalty established by the Secretary of the Interior based upon the estimated value of leased lands.

The problems resulting from the current system include:

- (1) A serious dampening effect on competition; and
- (2) Huge vertically-integrated petroleum companies dominate the bidding.

Additionally, under the current system, it appears that the Department of the Interior's regulation of leasing schedules is inadequate. As a result, areas may be developed either too quickly or too slowly.

There are at least ten alternative leasing systems (4 royalty systems, 4 rental systems, and 2 profit sharing systems) which deserve serious examination and consideration, including:

1. Fixed royalty/bonus bidding;
2. Fixed bonus/royalty bidding;
3. Royalty schedule decreasing overtime;
4. Two-parameters royalty schedule;
5. Rental payments/bonus bidding;
6. Fixed bonus/rental bidding;
7. Oil pledge/bonus bidding;
8. Fixed bonus/oil pledge bidding;
9. Fixed profit share/bonus bidding;
10. Fixed bonus/profit share bidding.

In brief, the O.C.S. oil reserves belong to the American people. Before they are leased, it is essential that all principal leasing systems are fully evaluated and considered to ensure that the federal government provides for the most responsible and economically sound protection of our interests.

IV. PROCEDURES FOR EVALUATION

The procedures followed by the Department of the Interior for evaluation of lease sales does not ensure a systematic, reasoned decisionmaking process. The procedures for public participation in the hearing process hampers full public participation. The Department of Defense excludes areas from consideration for lease sales, on the basis of national security, in a manner that prevents review of the decisionmaking process. As a result of those exclusions, other areas may be selected for leasing which may be more environmentally sensitive.

V. SUBSTANTIAL EVIDENCE EXISTS TO INDICATE THAT A DETERMINATION TO DRILL HAS ALREADY BEEN MADE

Statements from high ranking officials in the Department of the Interior indicate a commitment to O.C.S. development. The refusal of the Department of the Interior to await establishment of a national energy policy, and the refusal to postpone designations until after an adequate final program E.I.S. is considered in the decision making process, indicates that the E.I.S. is only a post hoc rationalization for a decision which has already been made.

VI. THE FEDERAL COASTAL ZONE MANAGEMENT ACT

The Department of the Interior's plans to proceed with O.C.S. leasing prior to the completion of coastal zone management plans by impacted states circumvents the purposes of the 1972 Coastal Zone Management Act. O.C.S. leasing should be postponed until such time as the states have had an opportunity to adopt coastal zone management plans and have such plans approved by the U.S. Secretary of Commerce, as provided for in the Coastal Zone Management Act. Once such approval is obtained, any federal agency conducting or supporting an activity directly affecting the coastal zone shall, to the maximum extent practicable, conduct such activities consistent with approved management programs.

The Energy Element of California's Coastal Plan adopted by the Coastal Commission on January 23, 1975, proposes for California the policy that new offshore oil and gas development shall be permitted only after: (1) the need for petroleum has been clearly established in light of anticipated flows to California from the Alaska north slope and other production sources, and consideration is given to California's capacity to refine and store anticipated inflows; or (2) development of the O.C.S. off California has been clearly identified as an integral and priority part of a comprehensive balanced national energy conservation and development program. Other policies in the energy element adopted by the Coastal Commission include: (1) allowing offshore drilling

only where safe; (2) encouraging consolidation of drilling production and processing sites; (3) requiring the use of submerged completion and production systems where feasible and environmentally safe; (4) minimizing the impact of onshore facilities; (5) establishing an oil spill liability fund; and (6) protecting against any adverse impact of O.C.S. development by seeking an agreement with the Department of the Interior that no federal leases be approved until the Department of the Interior makes a commitment to undertake a comprehensive environmental protection plan in regard to O.C.S. development. The policy recommendations of the California Coastal Zone Conservation Commission have evolved out of a long planning process. The Department of the Interior should not be allowed to circumvent the purposes of the Federal Coastal Zone Management Act by ignoring the position of the California Coastal Zone Conservation Commission in regard to O.C.S. development.

I. STATEMENT OF INTEREST

Concern regarding the Department of the Interior's proposals for expanded Outer Continental Shelf (hereinafter referred to as O.C.S.) development has been so great that for one of the first times in history local governments have joined together in an attempt to present a coordinated response to a federal program. A Council of Mayors, Councilmen and Councilwomen, and Supervisors has been meeting continually in order to assess the actions of the Department of the Interior and to prepare such a response.

Those governmental entities which have participated in the Council are not representing only coastal interests. Many inland cities and counties have also participated on the Council. Moreover, in view of the fact that over 75% of the people live in the 30 coastal states, a desire to protect our coastal resources can hardly be deemed to be "parochial". Most importantly, however, we view our role in commenting upon the program Environmental Impact Statement (hereinafter referred to as E.I.S.) as raising questions of national interest in the wise utilization of our nation's natural resources.

II THE REQUIREMENTS FOR A LEGALLY ADEQUATE E.I.S.

N.E.P.A. mandates all agencies of the Federal Government to

Identify and develop methods and procedures, . . . which shall ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations. . . . 42 U.S.C., §102.1(b).

Moreover, Congress has established that it is the national policy to

(5) Achieve a balance between population and resource use which will permit high standards of living and a wide sharing of life's amenities; and (6) enhance the quality of renewable resources and approach the maximum attainable recycling of depletable resources. 42 U.S.C., §101(b).

The draft E.I.S. has failed to quantify environmental amenities. The purpose of N.E.P.A. to assure wise use of our national resources has not been furthered by the draft E.I.S. The specific inadequacies of the E.I.S. result from its failure to:

1. Adequately discuss the relationship between establishment of a national energy policy, with proper reference to the Project Independence Blueprint, and O.C.S. development.

- Supply System
Old Source
Conserv.
2. Adequately discuss our energy alternatives, including the alternative of conservation.
 3. Develop the data on marine resources necessary to an analysis of what impact O.C.S. development would have on those resources.
 4. Provide a detailed, rather than a conclusory analysis of the primary, secondary, and cumulative effects of O.C.S. development.
 5. Address the numerous major issues discussed in the following analysis.

RE

It is the responsibility of every federal agency undertaking major federal actions which may significantly affect the environment to carefully comply with the procedural requirements of N.E.P.A. These procedural provisions are not highly flexible. As stated in Calvert Cliffs Coordinating Committee v United States AEC, 449 F. 2d 1109 (D.C. Cir. 1971), the E.I.S. procedures establish a strict standard of compliance. As the Court of Appeals in that case stated:

The sort of consideration of environmental values which N.E.P.A. compels is clarified in section 102(2)(a) and (b). In general, all agencies must use a 'systematic, interdisciplinary approach' to environmental planning and evaluation 'in decisionmaking which may have

an impact on man's environment.' In order to include all possible environmental factors in the decisional equation, agencies must 'identify and develop methods and procedures * * * which will ensure that presently unquantified environmental amenities and values may be given appropriate consideration in decision-making along with economic and technical considerations.' 'Environmental amenities' will often be in conflict with 'economic and technical considerations.' To 'consider' the former 'along with' the latter must involve a balancing process. In some instances environmental costs may outweigh economic and technical benefits and in many other instances they may not. But N.E.P.A. mandates a rather finely tuned and 'systematic' balancing analysis in each instance.

To ensure that the balancing analysis is carried out and given full effect, section 102(2)(c) requires that responsible officials of all agencies prepare a 'detailed statement' covering the impact of particular actions on the environment, the environmental costs which might be avoided, and alternative measures which might alter the cost-benefit equation. The apparent purpose of the 'detailed statement' is to aid in the agencies' own decisionmaking process and to advise other interested agencies and the public of the environmental consequences of planned federal action. Beyond the 'detailed statement', section 102(2)(d) requires all agencies specifically to 'study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources.' This requirement, like the 'detailed statement' requirement, seeks to ensure that each agency decisionmaker has before him and takes into proper account all possible approaches to a particular project (including total abandonment of the project) which would alter the environmental impact and the cost-benefit balance. Only in that fashion is it likely that the most intelligent, optimally beneficial decision will ultimately be made. Moreover, by compelling a formal 'detailed statement' and a description of alternatives, N.E.P.A. provides evidence that the mandated

decisionmaking process has in fact taken place and, most importantly, allows those removed from the initial process to evaluate and balance the factors on their own.

The draft E.I.S. is not a detailed cost-benefit analysis.

The issue is whether it is legally adequate.

The basic criterion for establishing whether an E.I.S. is legally adequate is full disclosure of the possible consequences of an action:

At the very least N.E.P.A. is an environmental full disclosure law. . . the detailed statement required by section 102(2)(c) should, at a minimum contain such information as will alert the President, the Council on Environmental Quality, the public, and indeed, Congress, to all known possible environmental consequences of proposed agency action. Environmental Defense Fund v Corps of Engineers, 325 F. Supp. 728, 759 (E.D. Ark. 1971), aff'd, 478 F. 2d 289 (8 Cir. 1972).

In the E.D.F. case, supra, the court turned to the dictionary definition of "detail" and concluded that "Necessarily, the E.I.S. must be 'marked by abundant detail or thoroughness in treating small items or parts'." In discussing the need to balance complete disclosure against limitations on information which is available, the court stated:

In reviewing the sufficiency of an agency's compliance with section 102, we do not fathom the phrase 'to the fullest extent possible' to be an absolute term requiring perfection.

If perfection were the standard, compliance would necessitate the accumulation of the sum total of scientific knowledge of the environmental elements affected by a proposal. It is unreasonable to impute to the Congress such an edict. We preface our consideration of plaintiffs' contentions by declaring that the phrase 'to the fullest extent possible' clearly imposes a standard of environmental management requiring nothing less than comprehensive and objective treatment by the responsible agency. . . . Thus, an agency's consideration of environmental matters that is merely partial or performed in a superficial manner does not satisfy the requisite standard. EDF v Corp of Engineers, supra, p. 27.

Although the statement must be detailed, it must in this case address the broad policy issues of the program to expand O.C.S. development. The requirement for a program E.I.S., addressing broad policy issues is set forth in the C.E.Q. guidelines for implementation of N.E.P.A.:

In many cases, broad program statements will be required in order to assess the environmental effects of a number of individual actions in the given geographical area (e.g. coal leases) or environmental impacts that are generic or common to a series of agency actions (e.g., maintenance or waste handling), or the overall impact of a large-scale program or chain of a contemplated project (e.g., major links of highways as opposed to small segments). Subsequent statements on major individual actions will be necessary for such actions which have significant environmental effects not adequately evaluated in the program statement. 40 CFR §1500.6(6)(1), 38 Fed. Reg. 20552 [August 1, 1973].

The decision of the U.S. Court of Appeals for the District of Columbia in the case of Scientists' Institute for Public Information vs. A.E.C., 481 F. 2d 1079, 1086-88 (D.C. Circuit 1973), clearly sets forth the requirement for a program E.I.S. on an issue as complex as O.C.S. development.

The Commission takes an unnecessarily crabbed approach in assuming that the impact statement process was designed only for particular facilities other than for analysis of the overall effects of broad agency programs. Indeed, quite the contrary is true.

Individual actions that are related either geographically or as logical parts in a chain of contemplated actions may be appropriately evaluated in a single program statement. Such a statement also appears appropriate in connection with . . . development of a new program that contemplates a number of subsequent actions. . . [T]he program statement has a number of advantages. It provides an occasion for a more exhaustive consideration of effects and alternatives than would be practicable in a statement on an individual action. It ensures consideration of cumulative impacts that might be slighted in a case-by-case analysis. And it avoids duplicative reconsideration of a basic policy question.

The statutory phrase 'actions significantly affecting the quality of the environment' is intentionally broad, reflecting The Act's attempt to promote an across-the-board adjustment in federal agency decision-making so as to make the quality of the environment a concern of every federal agency. The legislative history of The Act indicates that the term 'actions' refers not only to construction of particular facilities, but includes 'project proposals, proposals for new legislation, regulations, policy statements, or expansion or revision of ongoing programs. . .'. Thus, there is 'Federal Action' within the meaning of the statute not only when an agency proposes to build a facility itself, but also whenever an agency makes a decision which permits action by other parties which will affect the quality of the environment. Scientists' Inst. for Pub. Info., Inc. v. Atomic Energy Com'n, supra, pp 1086-88 [footnotes omitted].

After careful review of the entire E.I.S. and the Project Independence Blueprint, we are particularly concerned that the E.I.S. does not provide for balanced, systematic, and reasoned decisionmaking in regard to O.C.S. development as one aspect of the establishment of a national energy policy. The Project Independence Blueprint is only superficially referenced in the Program E.I.S., despite the requirement stated in the Council on Environmental Quality Guidelines for implementation of N.E.P.A. that "The interrelationships and cumulative environmental impacts of the proposed action and other related federal projects shall be presented in the statement." 40 C.F.R. §§1500.8 (a)(1).

Also required to be included is a statement of:

(6) The relationship between local short-term uses of man's environment and the maintenance and enhancement of long term productivity.

(7) Any irreversible and irretrievable commitments of resources that would be involved in the proposed action should it be implemented.

(8) An indication of what other interests and considerations of Federal policy are thought to offset the adverse environmental effects of the proposed action identified pursuant to paragraphs (a)(3) and (5) of this section. The statement should also indicate the extent to which these stated countervailing benefits could be realized by following reasonable alternatives to the proposed action (as identified in paragraph (a)(4) of this section) that would avoid

some or all of the adverse environmental effects. In this connection, agencies that prepare cost-benefit analyses of proposed actions should attach such analyses, or summaries thereof, to the environmental impact statement, and should clearly indicate the extent to which environmental costs have not been reflected in such analyses. §1500.8 (5) (Emphasis added)

The Program E.I.S. fails to address these broad policy issues.

The role of O.C.S. development in our total energy picture is never clearly enunciated in the E.I.S. This is undoubtedly partially attributable to the fact that the Project Independence Blueprint was not released until after the release of the E.I.S. Such an analysis is crucial if there is to be compliance with N.E.P.A.

To attempt to make a decision on accelerated O.C.S. development without first determining what action may be taken pursuant to the Project Independence Blueprint is to attempt to make a major federal policy decision in a vacuum.

The fact that the Department of the Interior is proceeding with a schedule for tract specific E.I.S.'s and lease sales indicates that the program E.I.S. and the Project Independence Blueprint will not be considered in the manner required by N.E.P.A. Although the requirement that environmental factors be considered is stated in N.E.P.A. explicitly only once, it

has been well-established since Calvert Cliffs Coordinating Committee, 449 F. 2d 1109 (D.C. Cir. 1971), that implicit in all section 102 requirements is the concept that agencies are obligated to consider in good faith the environmental information which they have developed. Judge Wright's summary of the purposes of N.E.P.A. is perhaps one of the best judicial statements of the "consideration" requirement.

N.E.P.A., first of all, makes environmental protection a part of the mandate of every federal agency and department. The Atomic Energy Commission, for example, had continually asserted, prior to N.E.P.A., that it had no statutory authority to concern itself with the adverse environment effects of its actions. Now, its hands are no longer tied. It is not only permitted, but compelled, to take environmental values into account. Perhaps the greatest importance of N.E.P.A. is to require the Atomic Energy Commission and other agencies to consider environmental issues just as they consider other matters within their mandates. This compulsion is most plainly stated in Section 102. There, 'Congress authorized and directs that, to the fullest extent possible:

(1) the policies, regulations, and public laws of the United States shall be interpreted and administered in accordance with the policies set forth in this Act* * *.' Congress also 'authorizes and directs' that '(2) all agencies of the Federal Government shall' follow certain rigorous procedures in considering environmental values. Senator Jackson, N.E.P.A.'s principal sponsor, stated that '[n]o agency will [now] be able to maintain that it has no mandate or no requirement to consider the environmental consequences of its actions.' He characterized the requirements of Section 102 as 'action-forcing' and stated that '[o]therwise, these lofty declarations [in Section 101] are nothing more than that.'

The sort of consideration of environmental values which N.E.P.A. compels is clarified in Section 102(2) (a) and (b). In general, all agencies must use a 'systematic, interdisciplinary approach' to environmental planning and evaluation in decisionmaking which may have an impact on man's environment.' In order to include all possible environmental factors in the decisional equation, agencies must 'identify and develop methods and procedures * * * which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations.' "Environmental amenities will often be in conflict with 'economic and technical considerations.' To 'consider' the former 'along with' the latter must involve a balancing process. In some instances environmental costs may outweigh economic and technical benefits and in other instances they may not. But N.E.P.A. mandates a rather finely tuned and 'systematic' balancing analysis in each instance. Calvert Cliffs, supra, pp. 1112-13 (footnotes omitted, emphasis added).

As stated by Frederick Anderson in N.E.P.A. in the Courts (Environmental Law Institute 1973): "A statement's adequacy, in the end, is measured by its functional usefulness in decisionmaking. The statement must be of a nature and a form that enables the decisionmaker to consider environmental factors in good faith". Both the timing and the content of this program E.I.S. leads us to the conclusion that it will not aid in the type of systematic and reasoned decisionmaking in regard to establishment of a national energy policy required by N.E.P.A. It is for those reasons legally inadequate.

The discussion of energy alternatives is also inadequate. An E.I.S. must include:

(4) Alternatives to the proposed action, including, where relevant, those not within the existing authority of the responsible agency. (section 102(2)(d) of The Act requires the responsible agency to 'study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflict concerning alternative uses of available resources'). A rigorous exploration and objective evaluation of the environmental impacts of all reasonable alternative actions, particularly those that might enhance environmental quality or avoid some or all of the adverse environmental effects, is essential. Sufficient analysis of such alternatives and their environmental benefits, costs and risks should accompany the proposed action through the agency review process in order not to foreclose prematurely options which might enhance environmental quality or have less detrimental effects. §1500.8(4) (emphasis added)

The draft E.I.S. does not provide the required analysis.

N.R.D.C. v Morton, 458 F. 2d 827, (D.C. Cir. 1972) is a case specifically addressing the need to discuss energy alternatives to O.C.S. development: "What is required is information sufficient to permit reasoned choice of alternatives so far as environmental aspects are concerned." N.R.D.C. v Morton, supra, at 839.

Other E.I.S.'s have been found to be legally inadequate for providing conclusory and uninformative discussions about the alternatives to the project. See Monroe County Conservation Council v Volpe, 472 F. 2d 963, 697 (2d Cir. 1972).

Although the E.I.S. includes a 35 page discussion of the nation's energy alternatives, we do not believe that the E.I.S. is adequate in its treatment, or provides a basis

for good faith consideration of those alternatives.

"N.E.P.A. requires that an agency must--to the fullest extent possible under its statutory obligations--consider alternatives to its actions which would reduce environmental damage." Calvert Cliffs v AEC, supra, at 1128. In view of our limited energy resources, it is important now, more than ever before, to fully analyze the consequences of our actions.

Inadequate attention is also given to the relationship between O.C.S. development and the coastal zone management plans now being prepared in the impacted states. That there must be such an analysis is also established by the C.E.Q. guidelines which state that the impact statement must include an analysis of "the relationship of the proposed action to land use plans, policies, and controls for the affected area." §1500.8 (a)(2)

In many places throughout the E.I.S., the B.L.M. admits that sufficient data is not available regarding specific environmental impacts. N.E.P.A., however, places an affirmative obligation upon federal agencies to develop the missing data. N.E.P.A.: ". . . makes the completion of an adequate research program a prerequisite to agency action. The adequacy of the research should be judged in light of the scope of the proposed program and to the extent to which existing knowledge raises the possibility of potential adverse environmental effect." E.D.F. v Hardin 325 F. Supp. 1401 at 1403 (D.C. 1971). Substantial evidence already exists to indicate that significant adverse

environmental impacts will result from O.C.S. development. B.L.M. cannot rely on the absence of available data to conclude that a resource may not be impacted. The proposed action is far too significant to proceed without a thorough understanding of its consequences.

Although the E.I.S. is over 1200 pages long, the entire first volume is really a description of the project. The discussion of the effects of the project are sketchy at best, and filled with conclusory statements. Many of the conclusions which have been drawn as to O.C.S. development have not been substantiated with supportive data as required by N.E.P.A. This requirement was articulated by the First Circuit: "A conclusory statement 'unsupported by empirical data, scientific authorities, explanatory information of any kind' (citation omitted) not only fails to crystalize issues but 'affords no basis for a comparison of the problems involved and the alternatives.'" Silva v Lynn, 482 F. 2d 1282, at 1287 (1973).

Whether it be by searching other literature sources or proceeding with gathering baseline data, specific scientific data must be assembled to allow for an intelligent analysis of the impact of O.C.S. development.

We believe that a supplement to the draft E.I.S. is essential to meet the requirement of N.E.P.A. It is important to remember, however, that any addendum to the

E.I.S. will be required to go through the same commenting and review procedures as the original. In the case of N.R.D.C. v Morton, supra, the District Court on remand ruled that the addendum prepared by the Department of the Interior to fill in the gaps in the initial statement could not be considered as part of the final statement without going through the same commenting process as was used in producing the initial statement. A more recent case, which comes to the same conclusion, relying on N.R.D.C., is Why? Assoc. v Burns 372 F. Supp. 223 (D.C. Conn.). There the court stated:

The requirements of circulation for comment and forwarding for 'front office' review of an E.I.S., supplemental or otherwise, are no mere technicalities. The circulation and review requirements are critical features of N.E.P.A.'s efforts to ensure informed decision-making by providing procedural inputs for all responsible points of view on the major environmental consequences of the proposed federal action. Thus, N.E.P.A. requires not only the solicitation of comments, but also the attachment of such comments to the E.I.S. itself, which must accompany the proposal through the federal agency's decisionmaking process.

Cases clearly establish the requirement for a reasonably complete draft E.I.S. Inadequacies may not simply be cured in the final. We have concluded that the draft E.I.S. does not meet the requirements of N.E.P.A.

Major issues which have either been inadequately addressed, or not considered at all, are discussed in the remainder of our analysis.

III INADEQUACIES OF THE E.I.S.

A. Development as an Integral Part of a National Energy Policy

Our nation is in the midst of formulating a national energy policy. For too long we have drifted, like a ship without a captain, on a course of ever-increasing energy consumption, and with little regard for how legitimate energy demands could be met. We have ignored the social, economic, and environmental impact of pursuing various energy alternatives, and consumed ourselves into a position where we have become heavily dependent upon other nations to supply our energy needs.

As a result of the energy crisis of last fall, a sense of urgency as to our energy policies was finally instilled in our national leaders. On November 7, 1973, former President Nixon gave his "Energy Emergency" message. In that speech he announced Project Independence. The goal of Project Independence was to meet America's energy needs from America's own energy sources by the year 1980. Although the goal of Project Independence is now open to question and has received widespread criticism, it resulted in a much-needed reevaluation of our energy position, and was the first real step toward adoption of a national energy policy.

Our national leadership finally realized that it was crucial to fully explore our energy options. Unfortunately, former President Nixon did not wait for the report on Project

Independence to make a decision as to O.C.S. leasing. On January 23, 1974, he directed the Secretary of the Interior to increase O.C.S. leasing to ten million acres beginning in 1975. Although the announcement was carefully couched in language indicating that such a commitment was contingent upon completion of an environmental evaluation, it became clear that a national commitment to this energy alternative had already been made.

That President Ford is following the same course of action became clear on January 15, when he delivered his Address on the State of the Union. Although that Address was the first step toward formulation of a national energy policy, the message indicated that a decision to expand O.C.S. development had already been made.

As a result of the commitments to O.C.S. development on the part of two national administrations, the Program E.I.S. was released prior to completion of the Project Independence Blueprint, thus, O.C.S. development has not been treated as an integral part of the establishment of a national energy policy. We believe that the decision was unwisely made, without a proper evaluation of the myriad of complex associated problems, and in violation of the National Environmental Policy Act.

B. The Need For O.C.S. Development Has Not Been Adequately Demonstrated

The E.I.S. contains only a conclusory, three-page discussion of U.S. energy demand projections. Any federal action taken to open up a resource as precious as the O.C.S. should be based on clearly demonstrated needs. Such an analysis of our country's energy demands is the primary purpose of the Project Independence Blueprint. Despite the fact that Project Independence Blueprint, with its elaborate supply-demand projections, is supposed to represent a comprehensive federal analysis of our energy picture, the E.I.S. does not even refer to Project Independence Blueprint when calculating future energy demands.

Three studies were discussed in the E.I.S.:

(1) the National Petroleum Council, (2) the Ford Foundation Energy Report, and (3) the Department of the Interior projections. The basis for the National Petroleum Council's projections for 1971 to 1985 are not stated. A high, intermediate and low projection of annual gains of 4.4%, 4.2% and 3.4%, respectively, are given. Basically, the projections simply continue historical growth rates, taking into account possible reductions due to price increases. The projections represent a continued failure to recognize certain natural limitations on our fossil fuel resources.

The Department of the Interior is in the process of revising its energy forecasts. As stated on p. 152 of the E.I.S.:

The original 1972 projection predicted mean annual energy growth rate of 3.6% for the 1971 to 2000 period. However, preliminary indications reveal that the modified forecast will show a lower rate. Considering the three different energy forecasts reviewed above, a guarded estimate of a 2 to 3% increase rate in energy use for the 1971 to 2000 interval appears reasonable. This range is somewhat less than the growth rate experienced between 1950 and 1972 and is significantly less than the rate of increase achieved during the late 1960's and early 1970's. Nevertheless, achieving a 2 to 3% increase in energy growth over the next 25 years will require innovative planning and utilization of our human and technical resources.

The projection above can be treated as little more than a rough "guesstimate". The approach is not acceptable when used as the basis for a major federal action significantly affecting the environment such as O.C.S. development.

We submit that the most valid demand projection is that from the Ford Foundation Energy Report. The Ford Foundation Energy Project Report actually projects three different scenarios: (1) a historical growth scenario, (2) a technical fix scenario, and (3) a zero energy growth scenario. Under the historical growth scenario, continued unrestrained demand (except for that resulting from price increases) result in energy use doubling between now and the

year 2000 in residential, commercial and transportation uses, and tripling in industrial uses. This scenario results in a 3.4% energy growth rate. Significantly, energy wasted in the historical growth rate scenario represents about 1/4 of the total energy consumption in the year 2000.¹

Even under the highest historical growth supply case, domestic oil requirements would be 5.76 billion barrels per year by 1985. If the O.C.S. should supply 20% of these requirements, the total O.C.S. land under lease should be about 21 billion acres in 1985. This could be satisfied by leasing at a rate of 2.5 million acres per year between now and 1985, which is only 1/4 of the rate projected under present policy.

With the technical fix scenario, the annual energy consumption would grow at 1.9 percent per year, a much more manageable growth rate. The technical fix scenario would be achieved entirely by elimination of inefficient energy uses rather than by requiring any substantial changes in our lifestyle.

The most promising scenario, however, in terms of resource preservation is that portrayed in the zero energy growth scenario. Only that scenario can be achieved without placing a tremendous strain on our technology and resources. The zero energy growth scenario is based not only on technological advances but also on a changing,

1

Ford Foundation Report, "A Time to Choose", (1974), at 295. Hereinafter cited as Ford Report.

though not less satisfying, lifestyle. Our society would be more service-oriented, with quality, long-lasting goods, and greater development of low-energy intensive industries under the zero energy growth scenario. The fringe benefits of this scenario would be less pollution, less congestion, less consumption and perhaps more tranquil lifestyles.

As indicated previously, one would expect that the draft E.I.S. for the proposed O.C.S. development would have discussed the energy projections set forth in the Project Independence Blueprint. The base case projections of U.S. total energy demands in the Project Independence report is a function of the price of petroleum. At \$4 per barrel, Project Independence Blueprint projects a 3.8% growth rate while at \$7 per barrel oil the growth rate would be 3.2%, and at \$11, 2.7%. Of great importance is the fact that the base case forecast was made upon the assumption that there would be no major Pacific, Atlantic or Gulf of Alaska O.C.S. leasing.

As stated above, the E.I.S. treatment of energy demand projections is rather cursory. Not only does it fail to discuss the Project Independence Blueprint, but neither is there any discussion in the section on supply and demand (p.150) of the possible effects which the Trans-Alaskan supply of crude oil may have on the demand projections of the nation. The only reference made to the Alaskan pipeline is found on page 351 of volume 2 of the

draft E.I.S. which states that it:

...is likely that PAD District V (i.e. the West Coast) will not need significant quantities of petroleum imports in the next decade or so if the Trans-Alaska pipeline is built. After 1985, increased demand may require imports.

This treatment of future Alaskan oil apparently is incorrect. A report, The Trans-Alaska Pipeline and West Coast Petroleum Supply, 1977-1982, prepared at the request of Senator Henry Jackson, Chairman of the Committee on Interior and Insular Affairs (Serial No. 93-51), reveals that:

Despite the differences in the level of deficit or excess forecast by the various respondents, there is one pattern they have in common: the District V deficit diminishes and/or the excess grows, beginning with the first year of pipeline operation and throughout the entire period. This pattern is quite at odds with the public forecast of industry and administration spokesmen prior to the 1973 passage of the law authorizing construction of the Trans-Alaska Pipeline. (Id. at 14.)

In brief, the projections of two of the three principal owner companies, and of the Department of the Interior, point to an excess of production over consumption in PAD District V beginning 1980, a surplus which apparently "could amount to as much as one billion barrels per day by 1982." Id. at 31.

Thus, not only does it appear that the Alaskan

crude oil will satisfy the demand projections of PAD District V--contrary to the findings in the draft E.I.S--but it will also have an effect on the national energy supply picture.

The report reveals that after 1980:

[a]ny crude oil that is still imported into the District, therefore, either reduces the District's deficit or increases its exportable surplus by an equivalent volume. Any of the supply from the District, which is 'blackened out' by North Slope oil, would in a similar manner be added to the net supply available in other markets. (Id. at 15.)

The chain of events which might follow the exportation of the PAD District V surplus to other PAD Districts is not even considered in the draft E.I.S. Yet future demand predictions go to the heart of accelerated O.C.S. leasing, because the less demand there is for oil and gas, the less necessity there is for an accelerated O.C.S. leasing program.

We submit that the failure to discuss the role of Alaskan oil in connection with future energy demand projections is a serious deficiency of the draft E.I.S. which must be remedied in order to satisfy the requirements of N.E.P.A.

C. A Conservation Proposal

1. The Need for A Conservation Program.

Mandatory energy conservation offers a viable alternative to accelerated development of our limited natural resources. The Federal Energy Agency (hereinafter referred to as the F.E.A.) in its Project Independence Blueprint makes it clear that the goal of "independence" cannot be achieved without an energy conservation program going far beyond any plans thus far proposed by our national administration.²

If the present national growth rate of 5% per year continues, then consumption of energy will double by 1990 - only 15 years away.³ Even if federal leasing of the O.C.S. were allowed, new domestic supplies could not be produced abundantly enough over the next fifteen years to satisfy that increased demand.⁴ And with our present rate of consumption, we may exhaust our fossil fuel supplies within 20-50 years, according to estimates set forth in Technology Review, M.I.T., February, 1974.

This nation's energy policy, or the lack of one, is one of the reasons for unabated energy growth. Unfortunately, President Ford has failed to propose a mandatory energy conservation program with a systematic and resourceful use of finite energy supplies. President Ford's State of the Union Message (January 15, 1975) exemplifies that failure. The imposition of higher tariffs on oil imports for the purpose of reducing energy consumption may

² Federal Energy Agency, Washington D.C., Project Independence Blueprint (Nov., 1974). Herein after cited as Project Independence.

³ Science Magazine (November, 1974), at 427.

⁴ Id. at 427.

have many inequitable results, and impose an undue burden on American citizens who are waging a battle against inflation during recessionary times. In addition, higher taxes on refined products may place an unacceptable burden on lower income families who proportionately spend more of their income on energy supplies.⁵

The President's proposal for accelerated O.C.S. development cannot begin to meet America's energy demands for another 8 to 12 years. Aside from the problem of lack of skilled manpower, drilling platforms and rigs, etc., necessary lead time would leave tracts now leased undeveloped for 4 to 5 years.

Stringent federal, state and local energy conservation legislation is necessary to make energy conservation a reality. If energy growth rates should be reduced to 2% a year, a harmonious balance between energy supply and energy demand could be attained.⁶ A recent Ford Foundation Study indicates that strong conservation measures would preclude the need to accelerate strip mining or offshore drilling for at least 10 years without affecting economic growth.⁷⁸

Another issue to take into consideration is the need to conserve limited natural resources for future generations. If the historical growth rate continues, a time will come when

⁵ Ford Report, supra n.1, at 128.

⁶ Id. at 326.

⁷ Id. at 326.

⁸ Id. at 330.

future generations will not have sufficient fossil fuels. Increased demand and fewer fossil fuels will result in higher fuel prices, although, with the development of alternative energy sources, fossil fuels may not be needed to supply our energy needs. Uncontrolled energy growth during our lifetime will jeopardize the long-term economic growth of future generations.

There are those who argue against a comprehensive energy conservation plan out of fear that total governmental control and centralization of authority would result.⁹ A decision to examine the implications of uncontrolled energy growth need not imply governmental coercion or a shift toward more governmental decisions and fewer private ones.

America's continued energy supply is an essential factor in this nation's economic, military, and social well-being. On behalf of the people, the federal government controls half of the nation's most accessible energy supplies.¹⁰ Decisions about how to lease these lands, and at what pace are in the hands of the government. Without a uniform and purposeful energy policy (which includes a comprehensive conservation plan) the government would not fulfill its responsibilities to the American people.

⁹ Stanford Research Institute, Meeting California's Energy Requirements: 1975-2000, Menlo Park, California, May, 1974
at 144 Herein cited as Stanford Study.

¹⁰ Ford Report, supra n.l. at 270 "... The national resource base is extensive; federal domain includes all public land, the O.C.S., and energy resources underlying some private land."

Oil companies have reaped tremendous profits from petroleum production. Unfortunately, oil companies are not accountable to the public but to their shareholders. Most industries function under economic pressures to maximize their short and long term profits. Under the present lease system, oil companies exercise substantial control over leased land developments, refinery production capacities and known natural resource reserves which go untapped. The lack of government control is the issue. Only the government can make decisions regarding trade-offs between environmental, social and supply questions.

By adopting strong incentives for energy conservation, the nation would curtail wasteful habits, ensure continued fossil fuels for future generations, and promote long-term national independence. We believe that the law requires consideration of the alternative of conservation. A number of conservation alternatives which must be considered could be implemented without loss of requisite services, life amenities, and without increasing the present life cycle cost of any specific energy development project.

2. Conservation Alternatives

(a) Transportation

(1) Motor Vehicles

Transportation consumes approximately one-quarter of
11
America's total energy output. Automobiles and trucks account

¹¹
Id. at 57.

for approximately 75% of the transportation energy.¹² Yet, automobiles are one of the most inefficient means of transporting people. Trains, on the other hand, are the most efficient carrier of people. Its use, however, continues to decline while airlines, the least efficient energy user,¹³ are the most rapidly growing form of mass transit.

Increased vehicle fuel consumption can be attributed to numerous factors such as heavier automobiles, increased reliance on automatic transmissions and air conditioning. Some would blame environmental regulations as the major cause of poor mileage performance and added maintenance costs. According to a study conducted by the Environmental Protection Agency (hereinafter referred to as E.P.A.), however, such allegations are unsupported.

Data collected from more than 2,000 1973 automobiles indicate that fuel economy loss due to pollution control systems is less than 8% when compared to uncontrolled vehicles.¹⁴ On the other hand, fuel economy loss due to air conditioning averages about 9% in normal weather conditions. Hot weather in urban traffic results in a 20% loss.¹⁵ The most important reasons for the decrease

¹² Id. at 57.

¹³ Id. at 57.

¹⁴ Remarks by Russell E. Train, then Chairman of the Council on Environmental Quality, Washington, D.C., June 13, 1973, at 3.

¹⁵ Id. at 3.

in gas mileage are bigger and heavier automobiles. E.P.A. engineers found that new vehicles having the same model designations have become heavier. For instance, in 1958 a Chevrolet Impala weighed 4,000 pounds; however, a 1973 model weighs 5,500 pounds. Studies prove that, as a car's weight increases, gas efficiency decreases substantially.¹⁶ A change of only 500 pounds can lower the average gas mileage by nearly 14%.¹⁷ A 1,000 pound increase in weight results in a decrease of 30%.¹⁸

In 1973, 93.4% of all cars sold in the United States were equipped with automatic transmissions.¹⁹ Yet, cars with automatic transmissions have been found to be bigger fuel consumers than cars with manual transmissions.²⁰ The British Automobile Association states that a 4-speed manual transmission saves 12 to 15 percent on gas consumption.²¹ The British Automobile Manufacturers' Association bases its opinion on a variety of tests such as the much publicized Union Oil Company economy run. Among other cars, two American cars of the same make with

¹⁶ Id. at 3.

¹⁷ Id. at 3.

¹⁸ Id. at 3.

¹⁹ Pope, Leroy, Automatic Transmissions Called Major Cause of Gas Shortage, The Los Angeles Daily Journal (1975).

²⁰ Id.

²¹ Id.

comparable engines competed, one with automatic transmission and the other with a 4-speed manual gear box. The manual shift car won with 23.1 miles per gallon to the 20.1 miles per gallon for the automatic transmission, a 15% savings.²² The Automobile Manufacturers' Association claims that the results were achieved with professional drivers and that similar savings would not be realized by normal-skilled drivers.²³ However, the British pointed to several extensive studies which involved European, American and Japanese cars. The tests were conducted under simulated average driver efficiency rather than professional driving skills. The results showed a 12 to 15 percent fuel saving for manual transmissions.²⁴

There is no reasonable basis to blame environmental regulations for fuel economy loss; rather, poor vehicular design and engineering properties have yielded the real reduction in mileage performance. Nonetheless, this incorrect misconception of the effects of environmental regulations are prompting individuals to propose a ban on environmental controls. An example is President Ford's proposal for a 5-year delay on automobile pollution standards to achieve a "40% improvement in gas mileage". One problem with the President's proposal is that it implicitly blames pollution controls for lowering gas mileage. Secondly,

²² Id.

²³ Id.

²⁴ Id.

at the cost of a small reduction in gas consumption, degradation of air quality will increase. Abeyance of pollution standards combined with increased reliance on coal (as natural gas supplies decrease) will result in continued deterioration of the environment. The trade-off between improved fuel economy and environmental degradation is unbalanced. An alternate proposal which can achieve the dual goals of more efficient fueled vehicles and clean air is urged here.

Through rather simple engineering innovations, it is technically and economically feasible to improve overall mileage from the average 12 miles per gallon to 20 miles per gallon by 1980 and to 25 miles per gallon by 1990, without shifting entirely or even predominantly to small cars.²⁵ Much can be done to improve fuel economy through design and engineering changes. For example, within a short time span, improved fuel consumption from 12 to 20 miles per gallon can be reached by the following methods:

(a) aerodynamic drag reduction through body redesign (which would result in a 5% fuel economy improvement); (b) rolling resistance reduction through use of radial tires (which would yield a 10% fuel economy improvement); (c) better load to engine match (which would result in a 10 to 15% fuel economy improvement); (d) substitution of 300 pounds of aluminum for 750 pounds of steel (which would result in an 18% fuel economy improvement);²⁶ (e) installation

²⁵

Id. Ford Report, supra n.1, at 57.

²⁶

Id. at 59.

of manual transmissions and use of 4-speed gearboxes (which would result in a 12 to 15 percent fuel economy improvement).

Such improvements might result in a price increase of \$450, but the fuel saving would more than compensate for the extra investment.²⁷ Many small and medium sized cars already average 20 miles per gallon or more. If the above suggestions were transferred into small car design, even greater savings in fuel economy could be realized.

Strong enforcement of the 55 miles per hour speed limit can reduce gas consumption by 2.8% for total automobile and small truck use and 1.6% for total national transportation fuel use. The forecast for automobile fuel use through 1990 projects an annual savings of about .31 quadrillion Btu in 1980²⁸ and about .33 quadrillion Btu in 1985. Another benefit of reduced highway speeds is the sharp reduction in highway fatalities. The National Highway Traffic Safety Administration reports that total traffic fatalities for the first third of 1974 were reduced by almost 25% relative to the first third of 1973, an average of about 1000 lives saved per month.²⁹

²⁷ Id. at 59.

²⁸ Project Independence, supra n.2, at 106 of Appendix A.

²⁹ Id. at 106 of Appendix A.

On a long-term basis, development of more efficient engines can further enhance gas mileage while decreasing energy consumption. One promising model is a lightweight diesel engine,³⁰ which is widely used in Europe by taxicabs because of its high fuel economy at the low speeds characteristic of urban driving.

If this and similar transportation measures were adopted, energy savings of 16 quadrillion Btu could be achieved by the year 2000. In other words, if the historic growth rate were to continue, transportation energy use would be 43 quadrillion Btu. If these and other conservation measures were adopted, only 27 quadrillion Btu would be consumed--or a 38% reduction of fuel consumption.

(2) Mass Transit

Public transportation is two to four times more energy efficient than the automobile and offers the benefits of improved air quality, reduction of congestion, and savings in fuel consumption. However, since World War II, ridership on urban public transit has fallen sharply, from 19 billion trips in 1945 to 5 billion trips in 1973.³¹

³⁰ Dekeney, J.P., and Austin, T.C., Auto Emissions and Energy Consumption, United States Environmental Protection Agency, Ann Arbor, May, 1974.

³¹ Id. at 63.

The private automobile now dominates the urban passenger travel market. The decline in popularity of mass transit has led to the present poor quality and inadequacy of public transit services. There are several ways to stimulate increased transit ridership: improving services by adding new equipment, improving public information and advertising about such services, and developing new forms of transit.

In order to increase the use of public transit and discourage inefficient use of automobiles, the following suggestions were offered by Project Independence Blueprint and are incorporated herein: (a) increasing consumer costs for operating cars in urban areas by raising tolls on bridges and highways entering cities; (b) increasing urban parking fees; and (c) establishing annual fuel use license fees. If auto incentives were used in combination with public transit incentives, bus ridership could increase by 20%.

Substantial fuel savings could be realized if intra-city travelers switched to mass transit. Various forms of mass transit presently exist: subways, monorails, buses, and new systems such as the Bay Area Rapid Transit (BART) in San Francisco. New systems could incorporate such innovations as flywheel or electric storage systems which capture heat otherwise dissipated in braking operations.³² Such systems would be a bonus for

³² Id. at 63.

underground transportation lines because the mechanism can retain heat loss and thus greatly reduce the air conditioning load in underground stations.

(3) Tax Incentives for Improved Ground Transportation

Our energy conservation proposal is geared toward reducing the historic energy growth rate by 38% by the year 2000. In order to encourage citizens to adopt new transportation habits and to encourage auto makers to produce more efficient cars, certain tax incentives should be implemented:

a. Federal subsidies should be offered to auto makers who produce cars that are lighter, have more efficient engine systems, and are better designed aerodynamically.

b. A tax should be levied on new and used cars which are unable to meet improved fuel economy standards of 20 miles per gallon.

The tax should be imposed no later than 1985 as it provides sufficient lead time for both new and used cars to reach the improved fuel standards. A sliding scale should be established so that, as a car's gas mileage worsens, the tax rate is higher.

New car buyers should be encouraged to invest in more efficient automobiles. Used car buyers should be urged to consider cars which are capable of getting 20 miles per gallon. Today, some

medium-sized and small automobiles are capable of meeting the new fuel standards. In addition, as auto makers slowly improve the engineering and design properties of new cars to meet the 1980 fuel standards, interim cars will get lighter, and more energy efficient. As today's new cars become tomorrow's used cars, a greater number of previously owned automobiles which can meet the 20 mile per gallon standard will be available for resale. The tax would be one means of encouraging used car buyers to bypass low performance cars in favor of more efficient vehicles.

More federal money must be allocated to funding mass transit. Though each state has different transit needs, more government funds must be directed to state and local governments to permit renovation or construction of improved mass transit systems. In his State of the Union Message, President Ford failed to mention the need for emphasizing mass transit as an affirmative means of decreasing energy consumption.

Revitalized or new transit lines will relieve the energy-related economic crunch on middle and low income families who spend proportionately more of their income on energy consumption.³³ In addition, mass transit will relieve urban traffic congestion while reducing mobile source emissions.

(4) Air Transportation

In the past, air transportation has not been a major

33

Ford Report, supra n. 1, at 128.

energy consumer. Projected growth of energy use, however, is expected to be 13% to 14% per year. The spectacular growth may be attributed not so much to passenger transport but to freight air transport.³⁴ Translated into more concrete terms, energy use will increase from 1970 consumption of 1.2 quadrillion Btu to 11.6 quadrillion Btu by the year 2000.³⁵

A number of practical measures should be implemented in order to decrease fuel consumption. First, the Civil Aeronautics Board should increase the load factors (seating capacity filled). Current scheduling regulations result in an average load factor of 54% of capacity. The recommended load factor is 67% capacity. This improvement would result in a 28% direct fuel savings for domestic flights and an 8% savings for international flights.

Second, a reduction in flight speed would also result in energy savings. In the past, airplanes have traveled faster than the speed at which fuel consumption is most efficient. Reduction of speed to this level would result in a 4.5% fuel savings. "The net result would lengthen flight times only 6%--only 20 minutes for a transcontinental flight."³⁶

Third, the C.A.B. should consider scheduling flight frequencies. Though air transportation is efficient in terms of time savings, it is extremely wasteful from an energy viewpoint: passenger transport is twice as efficient by rail and car; freight transport is more than ninety (90) times more efficient by rail and twenty (20) times more efficient by truck.³⁷ Thus, it is proposed that short haul air freight (less than 400 miles) should be shifted to truck and rail facilities.

³⁴

Id. at 49.

³⁵ Id.

³⁶ Id. at 57.

³⁷ Id. at 63.

(b) Commercial and Residential Building Design

(1) The Problem

"In the residential sector, the greatest potential for energy conservation lies in space conditioning which, at present, accounts for more than 60% of residential energy use."³⁸ In the commercial building sector, approximately 90 out of every 100 buildings operate at less than 90% of their potential energy efficiency due to poor maintenance.³⁹ Such single-purpose buildings with short occupancy times and lack of diversity for 24-hour use⁴⁰ consume more energy per hour than multiple-use buildings. The primary energy uses in the building sector can be summarized as follows:

- a. 57% for space heating and air conditioning;
- b. 33% for operating equipment, including hot water heating, home appliances, and office equipment; and
- c. 10% for lighting.⁴¹

³⁸ Ford Report, supra n. 1, at 46.

³⁹ Energy Element, supra n. 36, at 57.

⁴⁰ Id. at 52.

⁴¹ Project Independence, supra n. 2 at 123 of Appendix A.

The potential savings in energy consumption are substantial if an optimum combination of design improvement, including construction and maintenance policies, are implemented.⁴² If the historic growth rate for residential energy use were to continue, it is projected that homeowners would consume 32 quadrillion Btu by the year 2000. If conservation measures to improve space heating, air conditioning, water heating, etc., were implemented, projected use would be 20 quadrillion Btu or a savings of approximately 38%.⁴³

Many construction and rental market practices do not encourage the introduction of more efficient, economical and attractive building designs for heating, ventilation and air conditioning. Most houses, apartments and office buildings are built by speculative builders who are under intensive competitive pressures to sell or lease their buildings at the lowest apparent cost to the interested parties. Thus, energy savings investments are discouraged because people with authority in building designs are usually not the same people who operate them and pay the utility bills.

(2) Building Code Modifications

The regional specialization and decentralized nature of the industry makes specific federal proposals inappropriate. However, the federal government can play a

⁴² Energy Element, *supra* n. 36, at 58.

⁴³ Id. at 51.

key role in encouraging better construction and insulation designs by establishing the following policies:

First, revise the nation's building codes and periodically update them to make energy conservation a priority consistent with life cycle economics based on energy prices.⁴⁴

Second, make the federal building code a model to promote energy saving construction practices.⁴⁵ Agencies such as the Federal Housing Authority, Veteran's Administration and Small Business Administration, can revise their standards for issuing loans by requiring a life cycle cost for building designs.

Third, set an example for the nation by only purchasing buildings which are energy sufficient.

Fourth, establish lending programs to provide lower income home owners with subsidized, guaranteed loans which would allow them to improve the energy efficiency of their homes.⁴⁶

State and local governments should rewrite local building codes; because of regional climatic variations, building requirements will have to be varied. Regional agencies can undertake studies which will provide valuable information for reevaluating present building codes. An example of

⁴⁴ Ford Report at 55.

⁴⁵ Id. at 55.

⁴⁶ Id. at 56.

possible revisions in state and local building codes may be found in the Southern California Coastal Commission Findings regarding building and urban designs. A summary of their findings are set forth below:

- a. Reducing the area of glass windows generally saves initial and operating costs (and energy). The loss in natural light will require increased artificial illumination but this is more than offset by the gain in energy saved by the reduction in heating and cooling loads. For example, solar heat transmission is greatest through glass windows. 60 square feet of glass on a western exposure of a building will require a ton of refrigeration for cooling and consume a kilowatt per hour.⁴⁷
- b. A reduction of the surface of buildings not used for alternative heating and cooling energy systems may result in a reduction of the energy required for space heating.⁴⁸
- c. Inaccurate engineering calculations, excess safety factors, failure to account for people and appliance loads result in oversized equipment and inefficient operations.
- d. The stack effect in buildings, (that is, the tendency of high buildings to internally generate a powerful rising draft of air within the vertical service stacks) introduces unwanted outside air infiltration which building designs are generally inadequate to prevent.⁴⁹
- e. The present lack of energy storage systems to store heat and cold results in a loss of

⁴⁷

Energy Element, supra n. 36, at 58.

⁴⁸

Id. at 58.

⁴⁹

Id. at 58.

energy which otherwise could be stored for later use. This results in an increase in peak electrical need.⁵⁰

- f. Conventional chimneys, fireplaces, combustion devices, kitchen, laboratory, and laundry exhaust hoods are energy wasters. Heat exchangers can be used to recapture the energy.⁵¹
- g. More stringent insulation in walls, ceilings and floors and double glass windows, possibly with special coating, can show significant reduction of energy usage. Savings of up to 50% for the energy required for heating and 20% required for the energy required for cooling in new residential construction and 10% of both the heating and cooling energy in new commercial construction can be achieved.⁵²

These findings are an example of how relevant energy efficiency studies can be conducted by state and local government which ultimately lead to a reevaluation of existing building codes. Energy efficient construction codes will result in higher investment costs. However, studies show that the life cycle maintenance costs far outweigh the investment costs. For example, increased insulation costs for new homes will be approximately \$700 extra.. This additional cost includes insulation of a 1200 square foot home with storm windows, heavier insulation in the walls, ceiling and floor. "If the

⁵⁰ Id. at 59.

⁵¹ Id. at 59.

⁵² Stanford Study, supra n.9, at 144.

homebuyer gets a 10 year loan at 10% to finance this investment, his annual payment on the loan would be about \$110. Comparing this house with a typical insulated house in New York, this investment would save about 400 to 500 gallons of fuel oil per year, a dollar saving of \$100 to \$150 and a net saving of \$10 to \$40 a year. The insulation would produce further savings by reducing the electrical requirement for air conditioning." ⁵³

In addition, state and local governments could encourage development of new homes in clustered dwellings with built-in support activities. Clustering of dwellings in multiple units conserves energy for heating and cooling, since the ratio of surface to heated volume tends to decrease with increased building size. Planned unit development and major activity center developments provide opportunities to combine many sub-energy systems so that the sum of energy consumed for all processes working together is less than the total of individual systems operating separately. A rich diversity of transaction opportunities would reduce the need for trips out of residential areas if an activity center were planned in ⁵⁴ a convenient centralized locality.

These proposals do not centralize more government decisionmaking. Rather, these measures give new direction to an industry by promoting sounder construction practices while

⁵³ Ford Report, supra n. 1, at 48.

⁵⁴ Energy Element, supra n. 36, at 230.

conserving valuable and limited resources. As in the past, decisions in regard to specific building codes and development plans still remain with local governments. This particular practice allows for local input into a vital decisionmaking process.

(3) Tax Incentives for Improved Building Design

In order to spur adoption of energy conservation programs, certain tax policies should be revised. For example, existing price methods in electricity consumption promote energy growth through discounts for greater use at a time when greater conservation is needed. Electricity rates should no longer include discounts for large users. Rather, such rates should reflect the additional cost of generating extra power during peak hours.⁵⁵

Another proposal is to encourage homeowners to install better insulation properties. Under this plan, any owner of a residential building who installs thermal insulation, storm windows, and day/night thermostats would be able to claim a tax credit on his income tax equal to 25% of the material and/or labor costs.⁵⁶ The credit would be

⁵⁵ Ford Report, supra n. 1, at 258.

⁵⁶ Project Independence, supra n. 2, at 133 of Appendix A.

limited for a specified time period in order to encourage immediate response. Even without price or tax incentives, the rate of return on capital investment is about 14% (in real terms).⁵⁷ Thus, an increased rate of return coupled with a tax credit could spur residential owners to install such energy efficient properties. Projected annual energy savings as a result of retrofitting residences is 1.14 quadrillion⁵⁸ Btu per year by 1980.

A similar tax credit should be considered for commercial building owners. A 15% tax credit would be allowed on materials and/or labor costs which result in energy-saving modifications to existing buildings. The tax credit would be available for a specified time period. Anticipated energy savings would be .15 quadrillion Btu by 1980 and .18 quadrillion Btu by 1985.⁵⁹

Tax credit programs such as those suggested here benefit low and middle income families as much as high income families. Tax credits have the effect of lowering the initial installation costs to building owners. Lower installation costs have two impacts on the owner's investment decision: (1) with the tax credit, the owner can have less cash set

⁵⁷ Id. at 134 of Appendix A.

⁵⁸ Id. at 133 of Appendix A.

⁵⁹ Id. at 141 of Appendix A.

aside for the down payment, and (2) because the initial cost is less while the stream of savings remains the same, the rate of return on the project increases.⁶⁰ These proposals are tax measures which can be promulgated within a short time period without undue federal costs and at a tremendous energy savings.

(c) Industry

Industry's energy consumption accounted for 33% of the U.S. total energy consumption in 1972 or approximately 23.7 quadrillion Btu per year.⁶¹ The largest energy users include cement, steel, petroleum refineries, paper, aluminum, chemicals, glass, copper, and food industries.

A number of different reasons prevent more efficient energy use, some which can be remedied on a short term basis, while others require long term development.

1. Industry normally does not conserve energy when energy costs account for a small portion of total costs.
2. Many industry administrators lack awareness of energy conservation potential in processes and plants.
3. Some industries suffer from the unavailability of energy efficient processes, techniques and equipment.

⁶⁰

Id. at 157 of Appendix A.

⁶¹

Id. at 154 of Appendix A.

4. Some industries are unable to invest in new plants and/or equipment because of constraints such as capital availability at reasonable costs.⁶²

Yet energy efficient technology exists which can be implemented by a majority of large energy users on a gradual basis over the next 10 years. Possible means of saving energy for each industry will be discussed, after which a proposal for implementing such changes will be presented.

(1) Petroleum Refineries

A typical petroleum refinery is defined as a combination of standardized unit processes. A series of processes are necessary to convert crude oil into refined products. The energy consumed in this conversion is strongly dependent on the product mix required and on the specifications of the products. Energy efficiency can be improved through:

- a. Implementation of better maintenance of existing equipment, improved systems control and training of individuals to recognize wasteful practices.
- b. Recovery of process heat losses and recovery of power waste flue gases, steam and processed streams.
- c. Modifying product specifications to minimize energy consumption patterns.
- d. Optimizing capacity utilization to minimize energy consumption patterns.

⁶²

Id. at 159 Appendix A.

Projected energy reduction can be reduced by 20% or approximately .7 quadrillion Btu in 1985. Though some of the suggestions will require capital expenditures, energy savings may be sufficient to offset investments.

(2) Plastics

Enormous amounts of energy are used in the manufacturing of selected plastics (low-density polyethylene, high-density polyethylene, and polyvinyl chloride resins). Energy costs can be as much as 30% of the selling price of the products. An increase in the cost of energy will have a significant effect on the cost of producing plastics.⁶³

A reduction in energy consumption can be achieved by: (1) the use of raw materials (resins) which require less energy, and (2) shift away from high cost oil and gas to coal. The energy reduction potential in this industry group is estimated at 25% or approximately .5 quadrillion Btu by 1985.⁶⁴

(3) Cement

There are two basic processes for manufacturing Portland cement, wet and dry. In the wet process, grinding

63

The Federal Energy Agency announcement, KNBC Evening News, January 23, 1975.

64

Project Independence, supra n. 2, at 159 of Appendix A.

and blending of raw materials is carried out without using a slurry of the materials in water. In the dry process, the grinding and blending is formed using materials in their natural (dry) state . The energy consumed in the evaporating water in the cement kiln stage is a major user of energy. In the wet process 8.04 million Btu are used to manufacture each ton of cement. In the dry process, on the other hand, only 7.25 million Btu per ton are used to manufacture cement. Conversion of wet plants to dry plants is a potential source of energy savings.

Most of the energy consumed by the cement industry is used in the kiln proces. Electricity is the main fuel used in the process of grinding raw materials and operating the kiln. Improved grinding processes, including air classifiers which use hot fuel exit gases, can reduce electricity consumption.

Heat recovery systems are another way to reduce energy consumption. If most cement plants in the U.S. had efficient heat recovery attached to their kilns, they could save as much as 40% of the fuel used at the end of the kiln. Another means of reducing heat consumption is the use of preheated kilns. Elaborate raw material preheater systems have been used in European plants. Such modern systems are able to cut fuel consumption by as much as 49% as compared to the older preheated kilns. Another means of increasing heat transfer is to raise the speed of rotation of the kiln.

Also, because about 16% of the heat loss occurring in the kiln is through the walls, improved insulation techniques in materials could produce substantial fuel savings.

These techniques are presently available and in use in newer cement plants throughout the world. Though installation of such improvements would require a capital investment, tax deductions and a reduction in energy consumption may be sufficient to offset the cost. Potential energy reduction is estimated to be 35% or approximately .3 quadrillion Btu per year by 1985.⁶⁵

(4) Food Industry

Over the last few years, the increase in energy prices has affected the consumer indirectly through higher food cost. Some processors have experienced a doubling of fuel prices in 1973.⁶⁶ In the face of future fuel price increases, the conservation of energy is integrally related to minimizing higher food costs. Improved management of energy consumption has been receiving increased attention. New concepts are being developed and demonstrated such as:

- a. Preheating of incoming water and use of heat from waste water;
- b. Use of heat pumps to generate hot water for processes;

⁶⁵ Id. at 160-161 of Appendix A.

⁶⁶ Id. at 159 of Appendix A.

- c. Use of energy from the incinerator to supplement boiler fuels.⁶⁷ Such methods are capable of reducing energy use by 20% or .5 quadrillion Btu in 1985.⁶⁸

Agriculture has also examined some viable conservation measures which lower operating costs to the farmer, and ultimately, the consumer:

- a. A shift from gasoline powered tractors to diesel-powered engines which are more efficient and have higher Btu content than other fuels. Thus, the same amount of work can be done with less than 27% of gasoline fuel. The switch to diesel fuel tractors is expected to increase to 57% by 1980 and 75% by 1985. Diesel-powered combines are also gaining popularity and could amount to 70-80% of all usable combines by 1985.
- b. Reduction in plowing practices.
- c. Using equipment which is capable of multiple functions such as planting, applying pesticides and fertilizers in one process.
- d. Place greater emphasis on biological pest control methods, thereby reducing the need for petroleum based pesticides and herbicides.
- e. Use of natural fertilizers as a substitute for fertilizers which are petroleum and natural gas intensive.
- f. Use of wind mills for pumping water to animal water troughs as an alternative to electrical pumping systems.

67

The Federal Energy Agency announced on January 23, 1975 that an increase in petroleum products could cost the average American consumer \$265 to \$350. Cost increase is attributed to higher plastic products. KNBC Evening news, January 23, 1975.

68

Project Independence, supra n. 2, at 159 of Appendix A.

If such methods are implemented, the conservation potential in group amounts to 20% or approximately .5 quadrillion Btu in 1985.⁶⁹

(5) Paper, Aluminum, Copper, and Glass

These four industries have already implemented recovery programs which recycle used material for making new products. It has been demonstrated that recycled production is fuel efficient. An accelerated program could result in substantial savings while preserving limited valuable resources for future.

When two productions systems are compared, one using virgin materials and the other using recycled materials, the system using recycled materials consumes less energy when all stages of materials acquisition, processing and transportation are included. For the following materials, energy savings per ton of material recycled are:

- a. Aluminum - 200 million Btu per ton
- b. Ferrous - 12 million Btu per ton⁷⁰
- c. Glass - 1.3 million Btu per ton

Recycling discarded products has been shown to be technically and economically feasible. In 1972

69

Id. at 162 of Appendix A.

70

Id. at 171 of Appendix A.

almost 14 million tons of these materials could have been recovered and substituted for virgin material counterparts, and energy savings would have totaled about .172 quadrillion Btu.⁷¹

Recycling of paper at maximum practical recovery rates would reduce the energy potential of solid waste burning by about 10%. There would be further reductions in air, water, and land pollution associated with producing paper from virgin pulp. Using recycled fiber in paper and production systems appears to require less energy than using virgin pulp wood; however, conclusive data are not yet available.⁷²

(6) Steel

The steel industry is one example of how additional research and development is necessary before energy savings can be realized. The availability of new energy efficient equipment is already a problem. With proper planning by suppliers, it could be resolved over the long term. Newly developed technology will not be available for implementation until the 1980's, whether developed by private industry, government or both. With awareness of emerging technology and proper planning between now and 1980, action could be taken to fill the supply pipeline with needed materials.⁷³ The research and development program would concentrate on demonstrating promising new

71

Id. at 171 of Appendix A.

72

Id. at 171 of Appendix A.

73

Id. at 170 of Appendix A.

technology as rapidly as possible. New technology must also be oriented to process efficiencies which would include environmental pollution abatement.

The federal government can and should influence the level and pace of energy conservation efforts by U.S. industry. The government should focus on technology development which is both economically and energy efficient. Because a large portion of the total energy demand is consumed by industry, it is essential that adequate plans for industrial energy conservation be prepared. Therefore, we propose the following:

- a. The largest firms in the ten major energy consuming industries be required to submit an energy conservation plan;
- b. Increase federal and private industry research, development and demonstration programs oriented toward energy conservation technology in industrial processes; and
- c. Conduct major public information dissemination programs.*

(d) Natural Gas

Continuously operated gas pilot lights in the 30 million gas-heated homes in the United States are estimated to consume more

*

California Coastal Zone Commission, Revised Draft of Sixth Plan Element, Energy (1975), at 66-68, 96-99.

than 223 billion cubic feet of gas annually. In addition, pilots account for one-third of the total gas consumption of a typical gas range and may even account for as much as one-half of the total use where pilot flames are set too high. Safe electric or other types of ignition devices are available as a substitute for pilots in most residential-type appliances, and may be both built into new appliances and fitted into existing appliances. Replacing gas pilots in existing appliances may cost \$80 to \$100 and probably cannot be justified as a long range cost-benefit to the consumer. Electric ignition devices, however, may add only \$3 to \$30 to the cost of a new appliance and the reduced operating cost of the appliance is likely to more than offset the initial capital cost to the consumer over the life of the appliance.

California Senate Bill 1521 was passed in May 1974 and prohibits the sale or installation of all new residential-type gas appliances, except water heaters, equipped with a pilot light 24 months after an effective "intermittent ignition device" has been demonstrated or certified by the State Energy Commission, or January, 1977, whichever is later. Additions to existing structures as well as the residential applications are required by S.B. 512.1 unless

equipment manufacturers can conclusively demonstrate that the gas pilot: (1) has a lower cost than alternative ignition systems over the life cycle of the piece of equipment; (2) is more energy efficient than alternative devices for a particular piece of equipment; or (3) that public health or safety necessitates the use of gas pilots.

Routine maintenance of most gas appliances may also substantially reduce energy consumption. Dirt build-up or improper adjustment can reduce the efficiency of most gas appliances by as much as 50 percent.

The California Coastal Zone Conservation Commission further recommends that open gas flames not be allowed for advertising, promotional or decorative purposes in proposed new industrial, commercial or residential construction or additions. The Commission's recommendation is directed to both exterior and interior installations.

(e) Lighting

Lighting accounts for 20 to 25 percent of U.S. electricity consumption. In office buildings, lighting represents an even larger fraction, averaging 40 percent and in some cases up to 60 percent of the electricity use.⁷⁴ Promotional uses, which include decorative lighting, advertising and display lights and exterior wall lighting are large users of electricity.

⁷⁴

Id. at 68-71, 89-93.

Nationwide there has been a substantial increase in the average lighting intensity in commercial buildings. From 1940, when the average was 35 foot-candles, average lighting levels increased to 85 foot-candles in 1958 and to 124 foot-candles at present. However, many experiments indicate that lighting intensities between 10 and 50 foot-candles are sufficient for most usual activity and physiological needs rather than the 60 to 150 foot-candles levels currently being provided. Furthermore, lighting levels can be significantly reduced in areas such as corridors, lobbies, passageways, and storage areas. At the same time, within "work areas", selectively higher lighting levels may be used for "task zones" to both reduce the total lighting need and to increase the effectiveness of people working within the area. The Coastal Zone Commission has found that lighting levels for tasks up to 100 foot-candles can be achieved in most buildings designed for a maximum average requirement of 2.3 watts per square foot and recommends that lighting not exceed 2.3 watts (2.5 volt-amperes) per square foot except where higher levels are shown to be necessary for public health and safety. Where specific tasks require an extremely high degree of visual activity, exceptions may be made on a case-by-case basis.

Lighting needs may be further reduced by optimizing the use of natural light. In major office buildings and schools, a reduction of about 25 percent of the energy used for lighting may be attained if lighting fixtures near windows could be manually switched off or automatically controlled by a photo cell. The Coastal Zone Commission thus recommends that light

switches be provided so that portions of the building not in use or receiving sufficient natural light may be switched off selectively.

Selection of the type of light source is significantly related to energy consumption. Incandescent light bulbs are inefficient energy converters, using only 10 to 14 percent of the energy consumed for lighting and converting the rest to heat. Fluorescent lamps, on the other hand, are more than three times as efficient. The Coastal Zone Commission therefore recommends that only efficient lamps and luminaires as defined in the criteria of Section 9.3 and 9.4 of the Design and Evaluation Criteria for Energy Conservation in New Buildings (Proposed Standard 90-F) of the American Society of Heating, Ventilating, Refrigeration and Air Conditioning Engineers (ASHRAE) be allowed. Excessive and inefficient lighting indirectly causes an additional energy burden by increasing the heat load and thus increasing the need for cooling. Typically, every two watts of lighting requires one watt of cooling by air conditioning. The air conditioning burden may be reduced by use of "heat-of-light" systems which reduce the amount of heat generated due to lighting.

Selection of lamp type is also important for street lighting and other outdoor illumination. The standard mercury vapor lamps consume 2.3 to 2.9 times the energy for an equivalent amount of light than the more recently developed high pressure lamps (HPS). Although HPS lamps are both more costly and have a shorter life than mercury vapor lamps, experts agree that over the life cycle of the system HPS systems are in fact less costly than mercury vapor systems. The South Coast Regional Commission

indicates that substitution of HPS lamps for mercury vapor lamps could have saved 205 million kwh out of a total 307.6 million kwh used for street lighting in Los Angeles County in 1973. The Coastal Zone Conservation Commission thus recommends that new street and highway lighting use HPS lamps unless there are environmental, aesthetic, or public safety reasons for using another type to be equally or more efficient. It may be further possible to reduce the intensity of street lighting without adversely affecting public safety.

The Coastal Zone Commission recommends that electrical consumption for promotional signs and lighting can be reduced by regulating the size, type of lighting, and extent of such uses. While the energy use from electric signs accounts for less than 0.2 per cent of the total energy use in California, the South Coast Regional Commission estimates that prohibition of all outdoor ornamental and advertising flood lighting and limiting businesses to one outdoor illuminated sign for advertising purposes would reduce energy consumption by about 1-1/2 per cent units.

The Coast Zone Commission policy then is that no new advertising or ornamental signs in the coastal zone shall be electrically lighted except that businesses are allowed an on-site lighted sign for identification purposes which can be illuminated during darkness only during business hours; building and facade lighting other than signs is limited to the greater of 1000 watts or 2 per cent of the lighted interior load of the building.

(f) Heating, Cooling and Ventilating Systems

Eighteen per cent of the total national energy consumption is for heating buildings. Only 1 out of every 10 buildings, however, operates at 90 per cent or more of potential energy efficiency. Up to 50 per cent of the heating and cooling demand in buildings is a result of infiltration of outside air, due to inadequate insulation, caulking, and weather-stripping of almost all existing buildings. If these were improved in all existing buildings, 7.2 per cent of total nation wide energy consumption could be saved. In new construction, more stringent insulation standards (applicable to walls, ceiling, and floors) and double glass windows, possibly with special coating, could effect significant reductions of energy usage. Savings of up to 50 per cent of the energy required for heating and 20 per cent of the energy required for cooling in new residential construction and 10 per cent of both heating and cooling energy in new commercial construction could be achieved.

Use of electric resistance space heating results in consumption of at least twice as much energy to heat a given space as direct use of a primary fuel (e.g., gas or oil). The conversion efficiency for a fossil or nuclear fuel thermal electric power plant is only about 35 per cent; inefficiencies in transmission and delivery systems still further reduce the overall conversion efficiency for electric space heating. If gas is used directly for space heating, overall efficiency will range from 50 to 80 per cent, even considering inefficiencies due to improper furnace adjustment and start-up and shut-down operations.

The Coastal Zone Conservation Commission therefore recommends that for new or substantially remodeled residential, commercial, institutional or industrial developments no electric resistance heating (water or space) shall be allowed unless: (1) an effective solar delivery system and/or natural gas service are not available or adequate for meeting energy requirements; (2) electrical heating is needed for medical, health, or public safety reasons; (3) some other unusually high requirement for clean heat exists; or (4) a back-up system for solar heating and cooling systems is required.

Air conditioning's share of annual total national energy consumption has grown from an infinitesimal amount 20 years ago, to 1.6 per cent in 1960, to 2.5 per cent in 1968, to possibly as much as 4 per cent now. Because most of this energy is consumed during just a few months of the year, the strain of air conditioning loads on electric generating resources can be severe. One of every two homes in the country has at least one room air conditioner. One-half of new houses being built today are centrally air conditioned, compared to 1/20th a decade ago.

Among various types and makes of conventional room air conditioning units, energy efficiency in actual "cooling capability" can vary by as much as 80 per cent. Large central heating and air conditioning systems generally use 10 to 15 per cent less energy on the average than smaller decentralized systems. If central systems are to operate with the same flexibility as individual systems, however, proper controls must be installed.

The use of trees, shutters, sun screens, awnings, and

roof overhangs to shade windows from direct sunlight can substantially reduce heat build-up in buildings, and thus air conditioning requirements. Special glazing (metal-coated and/or double wall glass) can cut both cooling and heating requirements by about half. It is much more efficient to screen glass on the exterior, rather than with blinds, drapes, etc., on the interior of a building.

Heat transmission rates are also affected by the proportion of exterior walls, the amount of surface area in windows (heat loss and gain from windows cause much greater energy use than the potential saving in natural lighting), and the color, orientation, shape, and angle or exposure of building surfaces.

Operable windows in lieu of fixed glass will allow natural ventilation to enter the building, eliminating some of the need for air conditioning and mechanical ventilation during much of the year. Such windows must be well fitted and weather-stripped to reduce infiltration of outside air.

The Coastal Zone Commission recommends that for new or substantially remodelled developments air conditioning needs should be reduced by: (1) incorporating either mature planting, exterior architectural shading projections, or reflecting and/or insulating glass or exterior solar screens to shade or protect windows receiving direct sunlight in warm climates; (2) incorporating operable sash and vents in all exterior rooms for which ventilation is required by the local building code, and making such sash and vents weather-right by use of weather-stripping; and (3) having variable thermostats for areas with different air condition-

ing requirements. The Commission further recommends an air conditioning design using the best practical available technology with low-level or no electricity consumption shall be required and that new conventional (compressive refrigeration air conditioning shall be permitted only if an applicant can demonstrate that the life cycle costs of the conventional system are substantially less than the lowest cost alternative system available.

Heating and cooling systems are usually based on outdoor conditions not exceeded more than 2-2 1/2 per cent of the time. Except for facilities for the elderly, for industrial process, or for health care, such systems could be designed for the 5 per cent condition with only a slight increase in discomfort during a few hours per year. Excessive safety margins and failure to account for people and appliance heat-loads also result in oversized space conditioning equipment and inefficient operation.

Heating and cooling of vast amounts of outdoor air that circulate through buildings can also consume energy wastefully. By reusing already circulated air, the amount of outdoor air required for ventilation can be substantially reduced, from 5-15 cfm (cubic feet per minute) per person to 3-4 cfm per person in most buildings. Air quality can be maintained by using odor-absorbing devices and better filtration. Initial costs are no greater, since savings in fans, heating and cooling equipment, and ductwork more than offset the added costs for better filters and odor absorption equipment, and there are significant savings in energy and operating costs. Heat exchangers which allow the use of already air conditioned exhaust air from a building to preheat or precool

system intake air, are a means for reducing heating and cooling requirements in large buildings.

The present lack of capability of buildings to store heat and cold results in a loss of energy which otherwise could be used later to offset peak electrical demand loads. Conventional chimneys, fireplaces, combustion devices, kitchen, laboratory, and laundry exhaust hoods are all energy wasters. Heat exchangers can be used to recapture energy otherwise given off as waste heat.

Further energy conservation may be attained through the use of alternative heating and cooling systems. Among the systems which may potentially reduce energy consumption are:

Solar or Solar-Assisted Heating and Cooling.

(refer to Section II D, Energy Alternatives, infra.)

Heat Pumps. A heat pump is, in effect, a refrigeration machine that can work in a reverse cycle; thus it can either heat or cool a given space. Large electric heat pumps are comparable in efficiency to properly maintained gas furnaces; they can operate at two to three times the efficiency for cooling than most systems, especially compared to compressive refrigeration. A heat pump system can also be operated by solar power, thus further reducing electricity demands.

Nocturnal Evaporative Cooling. Roof-pond nocturnal cooling systems are technically feasible and practical for residential and low-load buildings in desert or valley climates such as in southern California, and are as effective as solar-powered absorption air conditioning. The evaporation in one hour of

1-1 1/2 gallons of water is the equivalent of one ton of refrigeration capacity; the operating cost would be only a fraction of the cost of electrical refrigeration. This is the simplest system that can accomplish both heating and cooling.

Rock-Bed Regenerators (RBR). Rock-bed regenerator (RBR) cooling systems use evaporation of water in the discharged air to chill rocks in a switched-bed rock-filled recuperator, which then cools inflow air. RBR's have been used successfully in Australia. The power consumption per square foot is only 1.0 watt compared to 8.8 watts (3-4 watts in California's coastal climate) for mechanical refrigeration.

(g) Research and Development

In view of the relative neglect of energy conservation in federal energy planning, it is not surprising that energy research and development (R & D) is out of step with society's needs. Only one energy supply, atomic power, has been substantially funded. The paucity of funds leaves many energy sources unexplored. This was evident as President Ford failed to allocate funds for research and development in his 1975 State of the Union message.

This misdirection has taken place because of the absence of a coherent national energy policy. . . . Energy research and development efforts are dictated by narrow economic interests in the private sector, by established vested interest in government (of which the Atomic Energy Commission has been an outstanding example), or by a confluence of these narrow corporate and governmental interests. 76

⁷⁶ Ford Report, supra, n.1, at 306.

In 1973, the federal government allocated \$643,000,000⁷⁷ for energy supply, research and development. 74% (\$480,000,000) was spent on nuclear energy. In comparison, the total expenditure on solar, geothermal, wind, and organic waste energy supplies was less than 10 million dollars. Research and development for energy conservation was funded at 20 million dollars while expenditures for systems research on health and ecological effects (about 20⁷⁸ million dollars) declined between 1972 and 1974.

Though expenditures alone do not signify progress, they do indicate priorities. Little research and development funds have been dedicated to energy conservation or to the development of new sources of energy. Alternate forms of energy such as solar⁷⁹ house heating or production of methane gas from organic waste⁸⁰ have been explored and partially developed by private sectors; however, without additional government and private industry development, such promising technologies will not be able to mature to viable new sources of energy.

Five research and development goals should be included within the framework of a national energy conservation program:

1. Assuring energy supplies at reasonable prices;
2. Using energy efficiently;

⁷⁷

U.S. Department of the Interior, Office of Research and Development, "Energy Research Program of the United States Department of the Interior," (March, 1974).

⁷⁸

Ford Report, supra, n.1, at 306.

⁷⁹

NSS/NASA Solar Energy Panel, An Assessment of Solar Energy of Solar Energy as a National Reserve, Univ. of Maryland (1972).

⁸⁰

Fry, John L., Methane Digestors for Fuel Gas & Fertilizer, New Alchemy Institute, News Letter number 3, Woods Hole, Mass., (1973).

3. Compatability of energy systems with a clean and safe environment;
4. Energy dependence; and
5. Diversity in energy supply technologies.

81

Two goals, energy supply, research and development and energy conservation, must receive equal attention as both are vital to lowering energy demand while assuring continued supply.

Environmental protection should be an integral part of an energy production and use policy. In the past, environmental concern has been more of an afterthought. As a result, expensive and sometimes inefficient control technology has been installed without much success. Past mistakes compelled the federal government and private sectors to include an ongoing environmental evaluation of potential new sources of energy. Hence, new energy sources should come to the marketplace environmentally safe. In the short term, this is the price the nation must pay for previous neglect; in the long term, it is a means of balancing continued growth and preservation of an environment for future generations.

Research and development should be accelerated in order to promote energy independence. Alternative domestic oil supplies such as coal liquefaction and shale oil can become economically and commercially plentiful by 1985.

82

81

Ford Report, supra, n.1, at 308.

82

Adelman, M.A., "Energy Sufficiency; An Economic Evaluation, Technology Review, 76:6, May 1974, pp. 44-47 and 56-58. See also U.S. Dept. of Interior, Final Environmental Statement for the Prototype Oil Shell Leasing Program, Wash. D.C., U.S. Government. Printing Office (1973).

Finally, diversity in energy sources is an essential component of greater flexibility. America must have greater energy options than at present. Unfortunately, both government and industry research have aimed primarily at technologies (such as coal gasification or nuclear power) which have significant economic promise. Energy sources such as wind power, solar energy, and solid and organic waste (which are not economically sensitive to large industry profits) have yet to receive significant research and development funding.

The Ford Foundation Study suggests seven major energy conservation projects which should be thoroughly researched and developed⁸³ as one means of reducing the historic energy growth rate.

1. Heat Transfer Technology

Basic research should be done on heat exchange materials such as heat pipes, heat transfer properties of various heat exchanger configurations, and heat transfer fluids. Developments in this area would improve the efficiency of electricity generation and would also supply new technologies such as solar sea thermal power.⁸⁴

2. Low Temperature Heat Applications

Today, power plants, homes and office buildings generate enormous quantities of low temperature heat. Such energy

⁸³

Ford Report, supra, n.1, at 318.

⁸⁴

Id. at 318.

is expensive and applications are limited. Research and development can help make low grade energy use cheaper. Development of new insulating materials and the cheap transport of low grade energy are also desirable for applications that do not intrinsically require high temperature heat.⁸⁵

3. Energy Savings and Space Conditioning

Research on heat transfer technology as applied to heating and cooling homes could yield substantial energy savings. Homes and office buildings possibly can be heated and cooled with just a fraction (on the order of 10%) of the fuel that is now used.⁸⁶

4. Industrial Steam Production Technology

The application of solar flatplate collectives and low temperature energy storage to industry steam production could result in significant fuel savings. These collectors, if commercially developed, could also be usable in residential and commercial sectors.⁸⁷

5. Integrated Power Generation

New technology should be developed for integrating decentralized electricity generation with electricity distribution systems.⁸⁸

6. Improvements in Efficiency of Power Generation

Power generation efficiency can be improved through the use of fuel cells, topping cycles, bottoming cycles, and improving the load factor of generating plants. Such items are important to reduce the energy requirements for producing electricity and

⁸⁵

^{Id.} at 318.

⁸⁶

^{Id.} at 318.

⁸⁷

^{Id.} at 318.

⁸⁸

^{Id.} at 318

for building power plants.⁸⁹

7. New Manufacturing Processes

Private industries should be encouraged to research and develop new manufacturing processes that will save substantial quantities of energy. Such development requires a cooperative⁹⁰ effort by both industry and government.

(h) Public Education

The government can implement incentives to promote fuel economy but public education and information are necessary functions which can raise the general level of consciousness. In the past, energy costs were low and represented a small fraction of a product's purchase and maintenance cost. With higher fuel costs, energy savings should be an integral consideration in the purchase of a product.

In order to make economically sound decisions, adequate and reliable information is necessary. For example, major appliances should be labeled indicating its energy requirements and operating costs. This would enable the consumer to evaluate the trade-offs between higher initial investment versus lower operating costs.⁹¹

Another example is to require builders or lessees to provide accurate information concerning utility cost to improve rental or purchase decisions. Though disclosure of such data may

⁸⁹ Id. at 319.

⁹⁰ Id. at 319

⁹¹ Id. at 53.

not be of sufficient importance for the construction industry to design and build structures with improved insulation, etc., it is one more step toward furthering that objective.⁹²

Widespread educational programs should be offered by local agencies and utility companies to show how consumers can further reduce fuel bills. Another by-product of consumer awareness is increased demand for energy efficient appliances, cars, buildings, etc. Public demands may be sufficient incentive for industry to further research and develop more energy efficient products.

⁹²
Id. at 53.

3. Evaluation of Energy Conservation Alternatives

The following questions arise regarding energy conservation proposals: What measures can local governments enact to implement an energy conservation plan? How effective can energy conservation be in terms of overall energy savings?

As a result of the energy crisis triggered by the Arab oil embargo, cities and local governments have, through necessity, become a forum of leadership for energy conservation legislation. A substantial concern is a " . . . public sense of returning to normal, i.e., wasteful energy consumption which signals a very great danger. If we are to avoid future energy deficits, it is imperative that continuing emphasis be placed on conservation." ⁹³ "The potential for increasing the efficiency of energy consumption is substantial. This goal will be possible, however, only if a 'conservation ethic' can be developed by energy users and legislators." ⁹⁴

The question still remains what measures can local government enact to implement an energy conservation plan? Some suggestions are supplied by Dean Harold Williams of the Graduate School of Management of UCLA. ⁹⁵ Local government, in order to

93

California Energy Planning Council; Calif. Energy Outlook 1974-1975 (June 1, 1974), p. 19.

94

Id. at 22.

95

Williams, Dr. Harold M., Energy Coordinator, Office of the Mayor, City of Los Angeles; Appraisal and Recommended Changes to the Emergency Energy Curtailment Plan (March 8, 1974), pp. 76-81.

implement both short and long term conservation action, could begin by enacting ordinances which would curb the waste of energy in all sectors by imposing percentage reductions in the use of energy and in substantial monetary penalties for failure to meet those standards.

The Emergency Energy Curtailment Plan (Ordinance No. 145, 350) which was enacted in Los Angeles to deal with the energy crisis in December 1973 is an example of a suggested ordinance for energy conservation. Local government should provide for the encouragement of energy conservation measures. The possible proposals in this area are numerous, but a particular example could be the 4-day/40-hour workweek. The 4-day workweek may have a significant positive impact on gasoline consumption, natural gas consumption and electrical power use. The city should strive to implement a policy which would strike the optimum balance between energy needs and environmental requirements. Local government should also strive for more efficient urban planning in terms of long-term energy conservation. Further, local governments should consider legislating the labeling of all major appliances sold in their respective jurisdictions according to the appliance's efficiency in the use of electricity and annual operating cost. This would aid the consumer in his purchasing choices and habits, and have a long-term effect on the production of more efficient household appliances. There has been an architectural trend in recent years towards the design of buildings which require extensive use of energy. Local government building codes should be rewritten to conform with the policy of establishing energy

conservation criteria with respect to the design or construction of new buildings and the reconstruction of old buildings. Further, building codes should be modified with regard to insulation standards for residential construction. The feasibility of improving insulation in existing residences should be a major concern of local government.

Further recommendations for conservation are provided by Dr. Ron Doctor in his presentation to the Capital Improvements Committee of the City of Los Angeles Water and Power Commission on August 29, 1974. With regard to the transportation sector, airlines should be required to reduce speed, limit taxiing, and reduce flights by 10%. With regard to automobile transportation, further carpooling should be implemented and encouraged as well as the continuation of the 55 mile per hour speed limit. The residential sector should be encouraged to continue to reduce thermostat settings, to weatherstrip households, to maintain the residential heating plant, to turn out unneeded lights and use lower wattage light bulbs. The commercial sector should be required to change lighting and ventilation schedules as well as reduce lighting intensity. There should be a mandatory reduction in illuminated advertising, decorative lighting and night sports lighting. Industry should continue to administer and efficiently maintain thermal management programs to reduce energy consumption.

Assuming these policies were implemented, what results in terms of energy conservation can be expected? Fortunately, there is a large quantity of data available in this area. The following information was compiled by the Rand Corporation for

the Office of Conservation and Environment of the Federal Energy Administration. During the winter of 1973-74, the Los Angeles Department of Water & Power had a unique experience with electric energy. When the oil embargo was imposed, the Los Angeles Department of Water and Power found itself very short of oil for generating electricity. The Mayor and City Council responded very quickly to the crisis with the passage of the Emergency Energy Curtailment Plan. Under Phase I of the plan, residential and industrial customers were to cut use by 10%, and commercial customers were to cut use by 20% over the corresponding period of the year before. Under Phase II, residential use was restricted 12%, industrial use 16%, and commercial use 33% over the corresponding billing period a year before. The penalty for excess use was a surcharge of 50% on the entire bill for the first period violation, and a cutoff of service for subsequent violations. Savings in electrical energy consumption through customer response to the ordinance was rapid, and total use fell more than expected. Instead of the expected 12% reduction in Phase I, consumption declined over 17% in the first two months that the ordinance was in effect.

The preliminary statistical analysis showed a rapid reduction in electrical use in all sectors, and especially in the commercial sector. The 17% energy consumption saving is even more significant in light of the 5 to 8.5 percent normal growth trend in electrical use which had been interrupted. Essentially, this means that the 17% figure is an absolute reduction, and when taken in conjunction with a 5%-8.5% normal growth trend, the resulting

saving totals an impressive 22%-25.5%.

Commercial sector use dropped even more significantly. Consumption by large commercial customers dropped 30% over the same month's use in 1973; that general reduction was being maintained in the summer of 1974 at approximately 20% below the monthly average for the summer of 1973. Some of the particular reasons for the adjustment, as well as measures taken to reduce electricity consumption, were outlined by the Rand Report. The findings indicated that: (1) lighting changes accounted for most of the reduced use; (2) most establishments regarded 20% as the reasonable amount to cut use without adverse consequences to their business; and, (3) most establishments are maintaining the reductions they made during the period the ordinance was in effect--both for economic reasons, and because they decided they could operate as satisfactorily with less electricity.

The following charts indicate a breakdown of month-to-month savings recorded by the Los Angeles Dept. of Water and Power. The Emergency Energy Curtailment Plan was implemented in late December and was phased out in late May.

ELECTRICITY GENERATION AND SALES DATA

Table C-1

NET ENERGY FOR LOAD, 1973

(10,000 kwh)

Month	kwh	Percent Change
November	152	-0.1
December	143	-11.5
January	134	-17.5
February	119	-17.0
March	132	-15.9
April	128	-14.4
May	135	-13.2
June	144	-12.0
July	162	-5.2

CHART 1

Table C-4

SAMPLE OF 65 LARGE INDUSTRIAL CUSTOMERS
(% Change Winter 1973-74 vs. Winter 1972-73)

Month	Total Industrial	Oil	Aero-Space	Other
November	0.143	0.287	0.022	0.017
December	-0.251	-0.299	-0.311	-0.114
January	-0.148	-0.136	-0.198	-0.154
February	-0.202	-0.215	-0.216	-0.167
March	-0.181	-0.158	-0.242	-0.180
April	-0.132	-0.071	-0.212	-0.182
May	-0.169	-0.183	-0.191	-0.131
June	-0.040	0.148	-0.191	-0.211
July	-0.111	-0.052	-0.160	-0.186

CHART 2

Table C-5

SAMPLE OF 85 LARGE COMMERCIAL CUSTOMERS
 (% Change Winter 1973-74 vs. Winter 1972-73)

Month	Total Commercial	General Merchandise	Apparel	Hotels	Office Building	Utilities	Hospitals	Public Administration	Educatio
November	0.0	0.01	-0.02	0.10	-0.01	-0.07	0.04	-0.06	0.03
December	-0.10	-0.20	-0.25	-0.09	-0.07	-0.13	-0.01	-0.24	-0.09
January	-0.25	-0.35	-0.43	-0.25	-0.29	-0.12	-0.12	-0.29	-0.26
February	-0.30	-0.44	-0.43	-0.24	-0.36	-0.17	-0.21	-0.38	-0.28
March	-0.29	-0.36	-0.43	-0.19	-0.36	-0.15	-0.23	-0.33	-0.28
April	-0.27	-0.35	-0.41	-0.21	-0.36	-0.18	-0.19	-0.37	-0.24
May	-0.25	-0.36	-0.41	-0.11	-0.29	-0.16	-0.18	-0.34	-0.23
June	-0.27	-0.43	-0.40	-0.17	-0.28	-0.01	-0.20	-0.31	-0.34
July	-0.21	-0.21	-0.34	-0.17	-0.24	-0.06	-0.17	-0.27	-0.20

CHART 3

With regard to conservation in local government operations, a newsletter of the National Association of Counties, dated January 15, 1975, indicated substantial savings for Los Angeles County. As a result of a wide-ranging conservation policy adopted for all departments, Los Angeles County reported savings of:

- 11.4 million kilowatts of electricity each month
or \$200,000 per month (a 20-25% cut in consumption)
- 100,000 gallons of gasoline per month
or \$37,000 to \$40,000 (a 12% cut)
- 50 million cubic feet of natural gas per month
or \$40,000 to \$50,000 (a 20% cut)

Further evidence of Los Angeles County's substantial savings comes from Dr. Doctor's comments before the Capital Improvements Committee on August 29, 1974, supra.

The County of Los Angeles took vigorous action in their own buildings because they didn't have jurisdiction over the users of electricity outside the City. So, they took action in their own buildings. Now, the County operates some 1700 buildings throughout the L. A. County, buildings of all types; generally, they fall into the commercial and government classifications. . . . The savings are substantial, more substantial than the 15 percent reduction that I've very conservatively assumed here.

These reflect solely governmental savings through more efficient guidelines regarding consumption. It is arguable that the private sector could do as well.

Data compiled by the California Energy Planning Council, in January of 1974, supra, reflected studies made in California

statewide regarding energy conservation. The first quarter (January, February and March) of 1974 was used as the test period as to gasoline and natural gas consumption in California. Certainly this cannot be considered a comprehensive statement on energy conservation, but the study can give reliable indications for the effectiveness of energy conservation. The focus of the study was to weigh the value and measure the effectiveness of specified conservation measures. With respect to gasoline consumption, the policies tested were: (1) a reduction of maximum speed limits to 55 miles per hour; (2) reduced automobile travel (assumptions as to reduced automobile travel were based on data from the monthly gasoline sales of the State Board of Equalization and adjusted by the tax refund data from the Office of the State Controller).

The chart below reflects California gasoline consumption during the first quarter of 1974. It reveals a total net savings of over 225 million gallons of gasoline, which represents a 9 1/2 percent reduction in gasoline consumption as compared with the same time period in 1973. The report describes the tabulation of the year-to-year gasoline consumption reduction between reduced speed and less driving. Those figures are based on State calculations.⁹⁶ This data indicates that of the total quarter savings of 9 1/2 percent, approximately 3 percent of this is attributable to lowered speeds and 6 percent to reduced travel.

⁹⁶ California Dept. of Transportation; Observed Facts of the 55 miles per hour Speed Limit ; (March 29, 1974).

CALIFORNIA GASOLINE CONSUMPTION

First Quarter 1973 & 1974

(millions of gallons)

	1973 (1)	1974 (2)	Year-to-Year reduction (3)	%
Jan.	789.6	735.5	54.1	6.85
Feb.	739.2	673.8	65.4	8.85
Mar.	852.1	745.7	106.4	12.5
Qtr.	2380.9	2155.0	225.9	9.5

CHART 4

With respect to natural gas, the following data is provided for the months during which gas consumption is normally the heaviest.⁹⁷

CALIFORNIA PERCENTAGE REDUCTION
IN CONSUMPTION OF NATURAL GAS
(Nov. '73 - Mar. '74)

Utility	1973		1974			5 mo. Avg	Millions Customers End of '73	% of Total	Weighted % of State Total Reduction
	Nov	Dec	Jan	Feb	Mar				
PG&E	4.3	14.9	5.3	6.1	3.5	6.8	2.444	39.86	2.71
SCE	.3	5.2	8.4	8.0	8.4	6.0	.409	6.67	.41
SDG&E	5.6	11.8	10.5	8.8	N/A	9.2*1	3.279	55.47	4.92
Totals	State Average *2						6.132	100	8.04

* Approximately 97% of State

*1 Four month average

*2 Approximately 99% of State

CHART 5

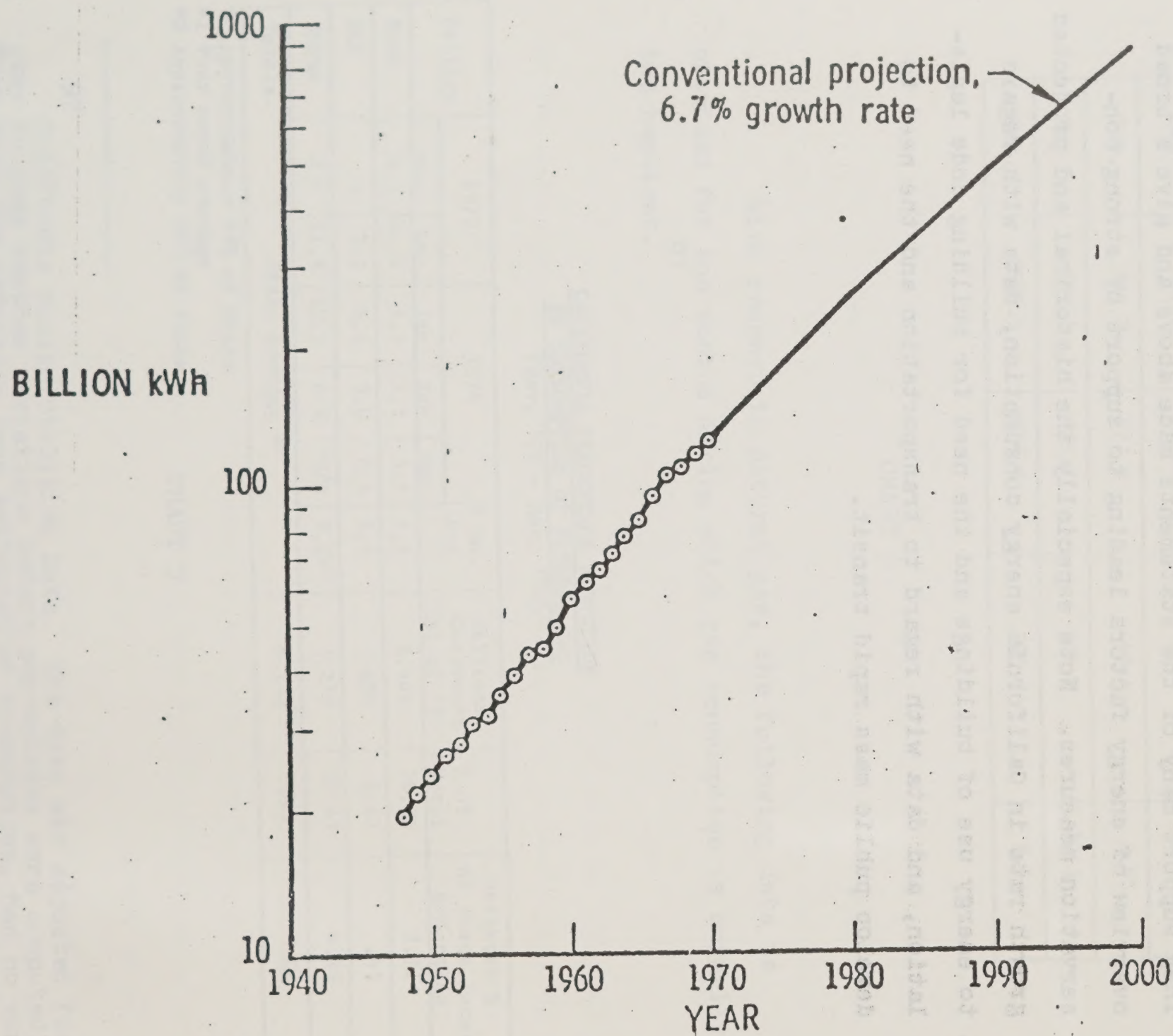
97

California Public Utilities Data. The data was adjusted for year to year weather variations before percentages were computed. They show the reduction from estimates of consumption, had no conservation program been in effect and had gas supplies not been limited.

The following graphs were prepared and presented by Dr. R. E. Doctor to the Capital Improvements Committee of the Los Angeles City Water and Power Commission on August 29, 1974. They support many of the statements made above and give a broad overview of energy factors leading to support of strong conservation measures. Note especially the historical and projected growth rate in California energy consumption, data with regard to energy use of buildings and the need for building code legislation, and data with regard to transportation and the need to develop public mass rapid transit.

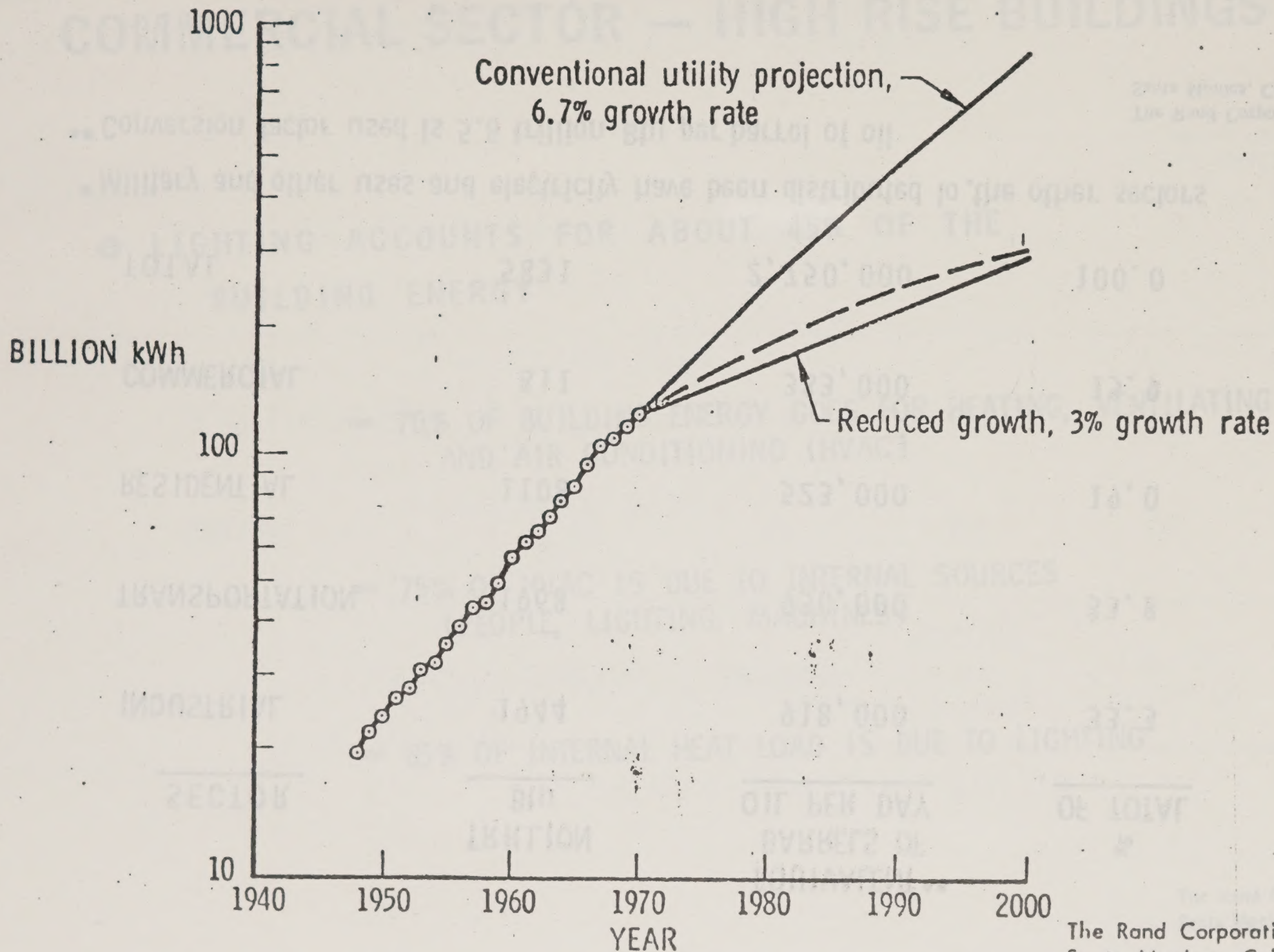


CALIFORNIA ELECTRICITY PROJECTIONS



The Rand Corporation
Santa Monica, Calif.

CALIFORNIA ELECTRICITY PROJECTIONS



The Rand Corporation
Santa Monica, Calif.

ENERGY USE IN CALIFORNIA (1971)*

<u>SECTOR</u>	<u>TRILLION Btu</u>	<u>EQUIVALENT** BARRELS OF OIL PER DAY</u>	<u>% OF TOTAL</u>
INDUSTRIAL	1944	918,000	33.3
TRANSPORTATION	1968	930,000	33.8
RESIDENTIAL	1108	523,000	19.0
COMMERCIAL	811	383,000	13.9
TOTAL	5831	2,750,000	100.0

* Military and other uses and electricity have been distributed to the other sectors

** Conversion factor used is 5.8 trillion Btu per barrel of oil

The Rand Corporation
Santa Monica, CA.

COMMERCIAL SECTOR — HIGH RISE BUILDINGS

● LIGHTING ACCOUNTS FOR ABOUT 45% OF THE,
BUILDING ENERGY

— 70% OF BUILDING ENERGY GOES FOR HEATING, VENTILATING
AND AIR CONDITIONING (HVAC)

— 75% OF HVAC IS DUE TO INTERNAL SOURCES
(PEOPLE, LIGHTING, MACHINES)

— 85% OF INTERNAL HEAT LOAD IS DUE TO LIGHTING

SOME DESIGN AND OPERATION EFFECTS (L.A. OFFICE BUILDING)

ENERGY—THOUSAND BTU/SQ FT

	COOLING	HEATING	COOLING + HEATING	PRIMARY ENERGY
NOMINAL	88	15	103	256
24 HR LIGHTING	137	4	141	414

The Rand Corporation
Santa Monica, CA.

TRANSPORTATION SECTOR

● 75% OF TRANSPORTATION ENERGY IS FOR
HIGHWAY VEHICLES

- 51% FOR AUTOS
- 22% FOR TRUCKS
- 1% FOR BUSES

● 14 % OF TRANSPORTATION ENERGY USED IN
AIR TRAVEL

The Rand Corporation
Santa Monica, CA.

HIGHWAY USE OF FUEL IN CALIFORNIA

● HIGHWAY USES CONSUME ALMOST 10 BILLION GALLONS OF GASOLINE AND DIESEL FUEL ANNUALLY (650,000 bpd)

● 75% OF HIGHWAY FUEL IS CONSUMED BY 10 MILLION AUTOS

● 20% OF HIGHWAY FUEL IS CONSUMED BY 2 MILLION TRUCKS

The Rand Corporation
Santa Monica, CA.

SHORT TERM ENERGY CONSERVATION POTENTIAL FOR CALIFORNIA

ESTIMATED
MAXIMUM SAVINGS
(Equivalent Barrels Per Day)

<u>SECTOR</u>	<u>CONSERVATION MEASURES</u>	
TRANSPORTATION	1. Airlines reduce speed, limit taxiing, reduce flights by 10%	11,000 — 14,000
	2. Carpooling	39,000 — 80,000
	3. 55 mph speed limit	11,000 — 22,000
RESIDENTIAL	4. Reduce thermostat settings	92,000 — 118,000
	5. Weather strip households	35,000 — 58,000
	6. Keep heating plant maintained	13,000 — 20,000
	7. Turn out unneeded lights, use lower wattage light bulbs	8,000 — 11,000
COMMERCIAL	8. Change indoor building lighting and ventilation schedules. Reduce lighting intensity	83,000 — 140,000
	9. Reduce illuminated advertising, decorative lighting, night sports lighting	6,000 — 12,000
INDUSTRY	10. Thermal management programs	50,000 — 99,000
TOTAL POTENTIAL SAVINGS**		340,000 — 540,000

* Based on the President's energy conservation recommendations

** Corrected for non-additive effects

11-18% of 1973 consumption

The Rand Corporation, Santa Monica, CA.

Short term achievements in energy conservation have been impressive. Credit should be given to both the public and the private sectors. The danger lies in a possible relaxation of the conservation effort due to a false sense of well-being. Several scientists and educators have recognized the need for, and importance of a strong energy conservation policy.

In his presentation of testimony to the Capital Improvements Committee of the Los Angeles City Water & Power Commission on August 29, 1974, Dr. R. E. Doctor stated:

The United States growth rate in overall energy demand must be reduced. If it is not reduced, then over the next 25 years, we can expect to experience increasingly severe energy shortages, environmental disruption and serious economic dislocation. The recent studies at Rand and elsewhere indicate quite clearly that it is possible to reduce future energy demands substantially by reducing the wasteful uses of energy, not by cutting to the bone but by reducing waste; that these reductions can be achieved with little or no disruption in our economy, that on the contrary, effective implementation of emergency conservation measures can lead to very significant economic benefits.

Dr. Robert Williams, senior scientist with the Ford Foundation Energy Policy Project in Washington, D. C., in testimony before the Capital Improvements Committee of the Los Angeles City Water and Power Commission on August 29, 1974, stated:

Our studies indicate that with the historical growth road to the future, the country will have to invest something like one and three-quarter billion dollars in the energy industry over the next 25 years in order to meet that

growth curve. If substantial energy conservation measures were put into effect, you should be able to save something on the order of 300 billion dollars over that period, and that, incidentally, takes into account the added capital requirements for the capital equipment necessary to bring on line energy conservation equipment.

In his speech, "We Must Break the O.P.E.C. Cartel", made before the Federal Energy Administration in San Francisco, California on October 10, 1974, Dr. Harold M. Williams, Dean, Graduate School of Management, UCLA, stated:

Our energy policy until now has been one of response to crisis and pressure groups. In the recent past, we have gone from a primary concern over the environment to one of conservation to survive the Arab embargo, to one of finding ways to increase supply and recycle dollars. It is now the time that we evaluate our position, clearly define our problems and needs, determine the results we must accomplish, and the behavior we need to encourage, evaluate the social and economic trade-offs and establish a comprehensive program with both short and long-term dimensions. The short-term objectives of the program must be geared to an immediately effective and tightly implemented program of energy conservation. It is perhaps more vital that we decrease consumption than we increase domestic production. We suffer less from energy shortage than we do from excess energy consumption. As a result, fuel conservation has very little to do with economic growth. We are talking about the elimination of totally unnecessary waste to which all of us contribute and which could quickly be reduced to the point where the price for oil producing exporting countries' oil would have to reflect a drastically lowered demand and where the price fixing coalition would find it difficult to continue their production or to allocate cutbacks.

4. Conclusion

The underlying premise for these proposals is that it is economically and technically feasible to reduce the energy growth rate to a long term average of 2%. An energy conservation policy would benefit major areas of concern--industrial growth, national energy independence, employment opportunities, preservation of limited valuable resources and protection of the environment.

The energy shortage is man-made, a product of past U.S. policies and lifestyles. In the past, government has not considered the long term or, in most cases, even the short term consequences of promoting ever increasing energy use except as measured by economic profits. The energy shortage and government neglect need not continue indefinitely if corrective measures are adopted now.

A decisive energy policy integrated with energy saving measures can reconcile an apparent conflict between continued economic prosperity and finite fuel resources. Fuel efficient vehicles, mass transit, thermal insulated commercial and residential buildings, recycling programs, heat recovery processes in industrial practices, etc., are just a few of the potential measures which can be implemented on a short term basis to help conserve energy. Coupled with fuel efficiency, research and development of new sources of energy is the key to greater flexibility and national independence.

This vigorous energy conservation plan offers a viable, realistic and practical alternative to accelerated exploitation of this nation's limited fossil fuels. One ramification of energy conservation is that fuel economy savings can be realized within a short time period. More importantly, the savings have been shown to be substantial without impairing industrial growth or displacing employment opportunities. The Southern California Council believes, in its judgment, that energy conservation is a far wiser and socially valuable decision than accelerated O.C.S. leasing.

D. Exploration of Other Energy Alternatives

The E.I.S. concentrates on the production of O.C.S. oil and gas as the primary source for meeting the nation's energy needs. Yet many viable energy alternatives are available to supplement the current domestic use of hydrocarbon fuels. These alternatives, which were not adequately examined in the E.I.S., include such energy sources as solar, wind, nuclear, geothermal, bioenergy, conversion of solid waste, oil shale and the increased use of hydro-electric power. The primary reason for the development of these alternative sources are the relatively slight adverse environmental impacts, low cost, and abundance of each of these power sources.

Two exceptionally promising new fields of energy are solar and geothermal. California is in a unique position in terms of the availability of these resources. Solar energy is described in the draft E.I.S. as a renewable resource which lacks many of the adverse environmental impacts associated with fossil fuel extractions. Its uses are limitless and among the applications now under development are solar heating, baking, solar power plants, cooking, furnaces, solar pumps and turbines, and solar sewage treatment.

The importance of solar energy has been recognized by several national organizations and scientists. The National Science Foundation in Solar Energy as a National Energy Resource at page 13 stated, "Solar energy is an essentially inexhaustible source potentially capable of meeting a significant portion

of the nation's future energy needs with a minimum of adverse environmental consequences. The indications are that solar energy is the most promising of the unconventional energy sources." The noted physicist, Dr. Arthur R. Tamplin, in June, 1973 issue of Environment, concluded, "Solar energy represents a pollution free and non-resource depleting source of energy in the near future. With an adequate program only modestly expensive when compared to today's standards (before increases in oil prices), this source of energy could be utilized in economically competitive fashion."

The following are among the conclusions and recommendations of the Solar Energy Panel of the American Society of Mechanical Engineers which met in Nov., 1973: "Solar Energy is received in sufficient quantity to make a major contribution to the future U.S. heat and power requirements. There are no technical barriers to wide application of solar energy to meet U.S. needs. For most applications the cost of converting solar energy to useful forms of energy is now higher than conventional sources, but due to increasing prices of conventional fuels and increasing constraints on their use it will become competitive in the near future."

The draft E.I.S. has taken issue with this point, arguing that solar systems are not economically competitive on a significant scale because of the initially greater investment for solar heating in comparison with conventional systems. One reason that solar power may not be at a more advanced stage is the large investment by major oil companies in conventional

sources of energy with greater potential for immediate profit and development. The draft E.I.S., citing Westinghouse Electric Corporation, states that government programs and incentives will be required to close the gap between near term costs for solar systems and additional costs consumers will be willing to pay.

Yet cost evaluation of a solar heating system should not be done on an initial cost basis, but rather on a life cycle cost basis. In their Energy Element, the California Coastal Zone Conservation Commission at page 121 finds that capital investment in a prototype domestic solar energy collector house has been demonstrated to be somewhat higher than a conventional house design, yet it is expected that the production models could reduce the construction cost. Also, there are several long term economic operating advantages over conventional house design: (a) both cooling and heating are accomplished through utilization of low cost solar energy collectors; (b) the solar energy system components and the heating and cooling systems are compatible with each other and are integrated in a total systems concept; and (c) the buildings as well as the mechanical and electrical systems are initially designed and constructed to conserve energy. The draft E.I.S. acknowledges that extensive application for solar power does exist today in home heating and cooling and water heating, using relatively inexpensive collectors.

The South Coast Regional Commission, part of the State Coastal Zone Commission, finds that the Southern California region lies in a particularly favorable location for mean daily

solar radiation. Moreover, in a large area of Southern California, over two-thirds of the natural gas consumed directly in space and water heating could be saved by the use of solar energy. On a month to month basis, the share of space and water heating provided by solar energy can be expected to range from 50% to 80%. Because solar energy can supply the major share of energy for space and water heating on a year around basis, utilization of solar energy can directly reduce the growth in base load demand for natural gas. A corresponding reduction in requirements for a new gas supply would also be indicated. Alternatively, more natural gas could be burned in the region's electric generating plant.

A second major new energy alternative is geothermal energy. Geothermal power is an indigenous source of energy which has a long term capability, does not utilize scarce fossil fuels, and can be relatively non-polluting. According to the California Coastal Zone Conservation Commission's Energy Element, geothermal potential in California is significant. There are 35 potential geothermal resource areas covering more than 15 million acres within California. Sixteen of these are "known geothermal resource areas", that is, the presence of geothermal resources has been verified. Geysers Field in California has been producing geothermal power since 1960.

The draft E.I.S. in its brief discussion of geothermal power mentions the pollution problems of geothermal energy, such as adverse air quality impacts and problems of waste water disposal. We agree that additional research is needed but there are

proposed methods to bypass many of the problems associated with geothermal energy. One method uses thermo-electric devices that would obtain electricity directly from the heat source with very slight environmental danger. Another method, the down hole heat exchanger, which theoretically would eliminate all the major difficulties with geothermal exploration, would make geothermal energy available in more locations and would provide an inexpensive, abundant, accessible source of power.

Although relatively few geothermal fields are currently developed, where there is a hint of a new geothermal field, the land above almost always has been leased to a petroleum company, a fact which reflects the potential of this new energy source.

Increased nuclear power is mentioned in the Environmental Impact Statement as an alternative energy source, but both the beneficial use and the existing environmental problems are inadequately discussed. The President's Council on Environmental Quality in their report on O.C.S. development states that "Nuclear energy will play a growing role in the Nation's energy supply between now and the year 2000. By 1985, nuclear energy is expected to increase to about 30% of the total net electrical energy, and by 2000 almost 70%." (page 3-24)

The electric utilities in the South Coast region, according to the Coast Regional Commission of the California Coastal Zone Conservation Commission, believe that nuclear power plants will provide the lowest cost and most certain source of electrical energy to meet the growth and demand which they have forecast for

the remainder of the century. Base load nuclear power plants would also be able to provide low cost off-peak power necessary to make pump storage facilities economical. The utilities also believe that the environmental impacts of nuclear power plants are, all factors considered, less than those of fossil fuel plants and also that nuclear fuel supplies are more assured than those for the petroleum-fired plants.

The environmental impacts of a large scale power plant are substantial. Nuclear power plants pose a safety hazard to population centers in the region due to the danger of damage to the facilities and resulting release of radioactive materials to the environment. A second problem is that of the heated waste water. When these thermal pollutants are discharged in the ocean, they have a disputed and still somewhat unknown effect on marine organisms. To control radioactive emissions, nuclear plants are designed to minimize accidents and their adverse effects, utilizing a "defense in depth" principle. This design includes setting reactors in remote areas as well as designing and constructing plants to prevent accidents and to contain the effects of accidents should they occur.

Radioactive waste storage, however, is a very significant problem. Because of the high concentrations of radioactive nucleides and very slow rates of decay, the waste materials must be isolated from the biosphere for hundreds of thousands of years if adverse effects to living organisms are to be totally avoided. Waste is presently being stored in below-the-surface man-made

storage facilities. Research is being conducted to find a permanent storage depository. As part of this research, pilot studies of storage in salt beds are being conducted.

According to the California Coastal Zone Conservation Commission, there are no coastal sites in the South Coast Region which would currently meet the Atomic Energy Commission's population density standards except for the western portion of Malibu, which has already been found not to meet the A.E.C.'s seismic activity standards, and the Channel Islands, which are areas of particularly great biological significance to the region.

Project Independence Blueprint points out that public acceptance of nuclear power is an important factor in overcoming the current problems constraining the use of nuclear power and the exploration and mining of uranium. Utility planning, site availability, licensing schedules, and implementation of measures to shorten the construction period are all influenced by public acceptance.

Nuclear power generation, however, has important advantages in being relatively insensitive to location of fuel sources because of low nuclear fuel transportation costs. Nuclear power may also be more environmentally acceptable than coal or O.C.S. drilling, provided that fears of nuclear accidents can be alleviated.

Generation of electricity through hydroelectric developments has generally been recognized as a renewable resource that does not directly cause air pollution. An environmental problem has been encountered with running river power plants, however, in that the use of streams for power will displace some forms of recreational activities and eliminate vast areas for land use. There is

also a very limited number of areas appropriate for hydroelectric plants. Therefore, the utilization of storage projects should be increased.

Pumped storage projects generate electric power for releasing water from an upper to a lower storage pool, then pumping the water back to the upper pool for repeated use. During off-peak hours when project capacity is not required by the system, water is pumped to the upper pool using energy generated by other sources such as large modern steam turbine electric units. Its economic advantage comes from converting low cost, low value off-peak energy to high value peak capacity energy.

Another viable but less publicized energy alternative is that of wind. Energy can be obtained from the wind by means of a device which extracts energy from a moving mass of air. That is, a fixed device can capture kinetic energy by rotation about an axis and, coupled to a generator, convert it into electricity. This alternate energy source was not discussed in the draft E.I.S. Wind energy is in use at various locations all over the world, providing substantial amounts of energy. The advantages in using wind energy are the following: inexhaustible supply, worldwide availability, free on-the-site production, and few adverse environmental impacts. The environmental problems that do exist are those of minor aesthetic and noise pollution from wind mills. The aesthetic design problems can occur in either very large windmills or a proliferation of small ones. With proper design attention, neither problem appears insurmountable. Both large and small windmills can be attractive in design. The open sea is probably

a better location for the larger windmills as noise pollution would not be a problem and the winds are steadier.

The principal drawback to wind power is the variable nature of the wind's energy as great fluctuations in wind velocity make consistent generator operation difficult. Even in very windy locations, slack wind periods occur. Therefore, some method for storing energy must be an integral part of most wind power generation schemes.

In sum, wind generators today could be an important source of electric energy in this country had not their technological development been virtually halted as a result of the gasoline engine. Unlike fossil fuel and atomic power sources, the windmill consumes no non-renewable resources and causes no atmospheric pollution or thermal pollution. It has positive aesthetic features in eliminating power lines as well as a beauty of its own. Wind energy could be a principal contributor of power in a mixed system and has the potential, depending on advances in the state of the art, of being a major regional and even a national energy source.

Shale oil is another alternative which is inadequately discussed in the E.I.S. This viscous petroleum, material extracted from maristone rock, can be refined into a complete line of petroleum products by conventional refining techniques. Although it is not possible precisely to predict the level of production or the technology that may be used, it is possible to establish a range of possibilities. According to Project Independence Blueprint, with a world oil price of \$11.00 per barrel, the estimated oil investment would be about 20%. Moreover, certain government actions coupled with

a stable price of \$11.00 would create the economic and institutional climate necessary to achieve higher levels of production. Under these conditions, according to Project Independence Blueprint, production levels of one million barrels per day could be attained by 1985.

Shale oil production, however, does affect the environment. At production levels above 200,000 to 300,000 barrels per day, emission from surface shale plants are expected to exceed the 1980 standards of 10 micrograms of sulfur dioxide per cubic meter. Further, the quantities of water used and the plant effluents could affect local water aquifer pressures and the water quality.

Another potential energy source which was not discussed in the draft E.I.S. is that of bioenergy. From organic waste, three forms of energy can be produced: natural methane gas from organic decay, oil from organic waste through chemical processes and the production of alcohol from crops through fermentation. According to the B.L.M. in their publication "Energy Alternatives and Their Related Environmental Impact", at page 379, the processes are as follows: agricultural land would grow cereal grains which are largely carbohydrates and then convert these grains by fermentation into ethyl alcohol, which is a convenient combustible fuel readily usable in motors. If we assume that the 100 million acres (or about one half of the acres not now required) are used to produce the grain for alcohol at a yield of 70 bushels per acre, this would be equivalent to about 18 billion gallons of alcohol or over 20% by volume of the 86 billion gallons of motor fuel consumed in the United States in 1970. To produce

oil from agricultural waste, the organic material is treated with carbon and water and then heated under pressure. According to data from the Bureau of Mines, 1971 collectible agricultural residues in the United States amounted to over 130 million tons annually with an oil potential of 170 million barrels, roughly equivalent to 47 million tons of low sulphur coal. The production of natural methane gas from organic waste is relatively easy as the gas is generated through the natural process of decay of the mass of waste and one simply has to tap and regulate this gas to provide a pollution free and inexpensive source of fuel.

The State Coastal Zone Commission's study on energy illustrates that the potential from waste is significant. In 1970 Californians produced 75 million tons of solid waste, about one half of which can be considered to be readily collected organic types of waste than can be used for energy production. In a study done by Stanford Research Institute for Pacific Gas and Electric, the Institute concludes that refuse could furnish about 10% of the fuel needed by utilities at prices competitive with other power generation fuels. This process has doubled advantages: it produces energy while solving very difficult land use and solid waste management problems.

Finally, as an alternative to increased domestic drilling on the O.C.S., we should not discount the current practice of oil and natural gas importation. This practice is currently under discussion and is being evaluated through both Project Independence Blueprint, the domestic energy self-

sufficiency program, and President Ford's new energy policy announced January 15. All future determinations regarding major changes in our national energy supply demand programs should await the final evaluation of these programs.

In conclusion, a Special House Democratic Task Force Report on New Sources of Energy (Jan. 13, 1975) states that:

"The long-term solution must of necessity feature the earliest possible development of energy alternatives to petroleum. This concentrated effort should include the rapid perfection of economically viable methods of coal conversion and levels of funding adequate to accelerate pure and applied research in solar energy, nuclear fusion, geothermal power, the environmentally acceptable recovery of oil from shale and any other alternatives that committees may choose to consider."

E. Production of Shut-In Wells and Secondary and Tertiary Recovery as Alternatives to Expanded O.C.S. Development

1. Shut-In Leases

Recently, the House Subcommittee on Regulatory Agencies has brought to public attention an allegation that oil and gas producers are actively withholding producible O.C.S. leases off the Gulf of Mexico. A number of producible tracts (185 in 1973, and 168 in 1974) have been classified as "shut-in" by the U.S.G.S. after application by the oil and gas companies. The procedures of U.S.G.S. allow such a classification, and permit a regional U.S.G.S. supervising engineer to grant such a classification based upon "a matter of judgment".

It has been estimated by the Federal Power Commission (hereinafter referred to as the F.P.C.) that 168 fields off of the Gulf of Mexico are capable of producing both oil and gas in large quantities. The Western Oil and Gas Association responded to the charges, claiming that mechanical problems, lack of producing facilities, etc., were the reasons for seeking the classifications.

The recent House Subcommittee investigation, however, found that, though some of the reasons were legitimate, in the majority of instances the classification of "producible shut-in leases" was sought as a means of

holding on to a lease beyond the original primary term of five years. One obvious benefit of such a maneuver is to allow oil and gas companies to produce valuable resources in the future when demand-market prices have increased.

The shut-in classification compounds the problem of estimating resource reserves. In order to classify an entire lease (which involves a tract of approximately 9 square miles), the petroleum producer need only drill one well capable of producing resources in paying quantities. All too often, the one well is located in only one of many reservoirs located on the tract. Because further drilling would result in the loss of the shut-in classification, oil producers prefer not to explore the possibility of further resources until sometime in the future.

A cornerstone to the formulation of a rational, cohesive, and long term energy policy is knowledge of the nation's resources. Without such data, it is impossible to establish a plan that can systematically meet future demands with limited fossil fuel resources.

During the House Subcommittee investigation, one witness from the F.P.C. indicated that American Gas Association estimates of natural gas should have been 54% higher. Such discrepancies in resource estimates adversely affect long term energy plans and shift the burden of higher costs to the consumer.

Based upon evidence and testimony presented,

the House Subcommittee found that the decision to lease 10 million acres per year is not rationally related to the nation's energy supply and demand projections. In fact, the Subcommittee has been unsuccessful in determining how the Department of the Interior arrived at such a figure.

Another issue raised by shut-in leases is the ability to develop the O.C.S. If oil and gas companies are unable to meet present production schedules because of the lack of manpower, drilling rigs, pipelines, geological evaluations, etc., how can the oil companies expect to meet the demands of an accelerated O.C.S. leasing program?

During its hearings, the Subcommittee heard testimony from an oil company executive who could not offer any assurances that the oil companies could meet the challenge of an expanded leasing program with sufficient numbers of trained personnel and equipment. If oil and gas companies are unable to develop the proposed 10 million acres, then what basis is there for leasing the land at this time?

(a) What is a Shut-In Lease?

A producible shut-in lease (gas and/or oil) is defined as a lease in which at least one well has been drilled and has been determined to be capable of being produced in paying quantities and for which a suspension of production or operations has been approved by a U.S.G.S. supervisor.

⁹⁸ Permanent Select Committee on Small Businesses, "A Report on the Activities of the Subcommittee on Regulatory Agencies; Energy Data Requirements of the Federal Government: Part I, Part II, Part III, Part IV, Testimony of Ralph A. Johnson; 93rd Congress 2nd Session (December 30, 1974). Herein after cited as Energy Data.

In contrast, a shut-in completion is a well that was drilled and produced, and thus classified as being no longer capable of production or its resources having been depleted. 99

At the present time there appears to be a great deal of controversy over the definition of "shut-in". In a recent press release,¹⁰⁰ it was explained that "until 1972 the statistics on shut-in well completions did not include wells left standing due to drilling on platforms, planning for secondary or other injection projects, delays in facilities, well-plugging by sand, mechanical problems, pressure depletion, or having an excessive-oil ratio. These well completions were considered 'active' because they were neither plugged with cement and finally abandoned, nor under current application for approval of workover or repair projects."

The controversy involves the apparent increase in "non-producing" oil well completions in the Gulf of Mexico from 942 in 1971 to 2,978 in 1972; and from 602 to 872 for gas well completions.¹⁰¹ The Department of the Interior claimed that the increase was not due to an actual rise in

⁹⁹ Leonard L. Sifer comments in a telephone conversation with the Los Angeles City Attorneys Office, January 10, 1974.

¹⁰⁰ Department of Interior, Press Release, December, 1974.

¹⁰¹ Energy Data, supra n. 98, at 134. Testimony of George L. Donkin.

shut-in wells, but rather a change in the method of reporting statistics on oil and gas wells by the U.S.G.S.¹⁰²

Unfortunately, the Department of the Interior's explanation merely serves to confuse and obliterate the real issues in question. For instance, one questions the logic of labeling a well "producidle shut-in" if it is incapable of producing because of insufficient platforms, and facilities, pressure depletion, or a well plugging by sand as a "producidle shut-in".

The purpose of the "producidle shut-in lease" classification is to enable the lease, in the absence of actual production, to be extended beyond its primary term of five years. U.S.G.S. Outer Continental Shelf Order No. 4 authorizes the lease extension beyond its primary term for as long as oil or gas may be produced from the lease in paying quantities. A well may be found to be capable of production in paying quantities when: (a) a production test of the well indicates that its production capability meets the requirements of the order. The U.S.G.S. District Engineer determines whether or not a well is capable of producing in paying quantities. No payment formula per se is used in the U.S.G.S.

determination. The well which qualifies the lease as a producidle shut-in may or may not be classified as a shut-in well itself;¹⁰³ (b) an outer continental shelf lease may be maintained beyond the primary terms, in the absence of actual

¹⁰²Id. at 134.

¹⁰³Energy Data, supra n. 98, at 112. Testimony of Ralph A. Johnson.

production, when a suspension of operations or production, or both, have been approved and; (c) the supervisor may approve a suspension of production, provided at least one well has been drilled on the lease and determined to be capable of being produced in paying quantities.

There are additional procedures by which oil companies may hold leases in nonproductive capacity. In addition to "producible shut-in leases", there are other technical classifications which may be used. First, under the Outer Continental Shelf Lands Act of 1953, the regional U.S.G.S. supervisor is authorized to unitize leases on a field-wide basis. Companies wishing to combine two or more O.C.S. leases must submit to the U.S.G.S. an initial plan of development which, if approved, extends the acreage in a "producible shut-in" status. Under this plan it is possible for a single producible well to hold a number of leases for years beyond their primary term.¹⁰⁴

Secondly, the regional supervisor also has the authority to consolidate two or more leases into production units even though only one of the unitization leases is actually producing oil or gas. Again, all leases under the unitization agreement are given extensions beyond their primary terms.¹⁰⁵

¹⁰⁴Id. at 134. Testimony of George L. Donkin.

¹⁰⁵Id. at 134.

The present classification procedure for producible shut-in leases has adversely affected the government's ability to efficiently administer O.C.S. leasing. A recent F.P.C. study indicates the continuing problems presented by the shut-in classification. The study, entitled "Offshore Investigation: Producible Shut-In Leases (First Phase), January, 1974, and March, 1974", provides some interesting insights into the issue of shut-in leases.

The F.P.C. study set forth ten common reasons for seeking producible shut-in classification: (1) preparing development plan; (2) waiting on platform production, or pipeline facilities; (3) waiting on market or marketing facilities; (4) waiting on completion of drilling program and/or evaluating geological and geophysical data in order to prepare development plan; (5) preparing economic evaluation, (leases considered marginal by operator at present established wellhead prices); (6) waiting on, or preparing evaluation of, drilling results on adjacent leases; (7) waiting on rig drilling equipment; (8) preparing development plans for economic evaluation after physical damage to production facilities (hurricane, fire, etc., damage); (9) no reason reported; and (10) waiting on F.P.C. certificates.¹⁰⁶

The next to the last reason given is particularly interesting in view of the requirement that a U.S.G.S.

¹⁰⁶Id. at 30.

supervising engineer approve a classification request for a producible shut-in lease. The House Subcommittee stated that: "Approval of such a request for a shut-in with no reason given would indicate confirmation of other reports that U.S.G.S. lease management and supervision of operations on existing leases was deficient. Beyond the possibility of lax supervision of producing leases, this study (F.P.C. study) indicated the possibility that even the most rudimentary examination of a lease operation did not take place and leases could be extended without any reason being given by the lease owner or required by U.S.G.S. Order No. 4."¹⁰⁷

The mismanagement of shut-in leases is only one of many findings that the Subcommittee made. The Subcommittee states, for example, that the Department of the Interior has not demonstrated the capability to efficiently administer the present leasing program. The Subcommittee also questioned the Department's ability to meet the challenge of an accelerated program. The Subcommittee points to inadequate resource evaluations, inequitable bidding systems and the lack of any systematic procedures for sound decisionmaking.¹⁰⁸

Although the Department of the Interior is responsible for the management of shut-in leases, the oil companies are not innocent beneficiaries. They have continued to take advantage of regulatory loopholes and lax Department of the

¹⁰⁷ Id. at 30

¹⁰⁸ Id. at 30

requests for producible shut-in leases, industry has pointed to lack of facilities and platforms, or waiting for completion of an oil program as posing obstacles in their attempts to "farm" the tract in question. Some reasons offered by the oil companies are valid and do prevent the oil companies from producing at full capacity. Yet mechanical problems or delay in facilities should have been resolved within a short period of time.¹⁰⁹

The House Subcommittee investigation suggested that producers were "not responding to current price levels but rather to anticipated higher prices." As one individual testified, "Producers prefer to speculate that price increases in the future will result in higher returns than commitment of new supplies at current price levels."¹¹⁰¹¹¹

In January, 1973, B.L.M. records indicated there were 185 O.C.S. shut-in oil and gas leases offshore Texas and Louisiana. These leases constituted a total of 838,477 acres for which bonuses of \$972,000,000 were paid.¹¹²

Even if industry could disprove "anticipatory pricing", the reason stated for seeking the producible shut-in classification raises the issue of preparedness. If, under the existing lease system, oil companies do not have pipeline or production facilities or the time and manpower to evaluate geological and physical data in order to prepare

¹⁰⁹Id. at 112. Testimony of Ralph A. Johnson.

¹¹⁰Id. at 114.

¹¹¹Id. at 114.

¹¹²

Letter to Mr. Norm H. Emerson From Professor Paul Davidson, University of Rutgers, December 19, 1974 at 2.

present development plans, then one must seriously question the company's ability to develop the proposed 10 million acres that the Department of the Interior now wishes to lease.

The present shut-in classification system also impairs government's ability to formulate a rational, cohesive, long-term energy policy because of unknown resource supplies. The Department of the Interior relies upon industry estimates of potential resources. Without independent resource data, the Department of the Interior is unable to fully evaluate industry projections. Thus, an unknown reserve of gas and/or oil is created about which the U.S.G.S. has no knowledge.

The problem is magnified if numerous tracts are brought together under a unitization proposal. Here, only one well in one tract is needed to qualify numerous leases for a shut-in classification. The projected capacity for the other tracts involved is completely unknown. Therefore, U.S.G.S. has no ability to gather or evaluate data as to potential reserves of oil and gas.¹¹³

In the F.P.C. report, raw data from other sources was gathered in order to develop a conservative estimate for the shut-in leases. Based upon history, significant gas production can be anticipated from shut-in leases. These

¹¹³Energy Data, supra n. 132, at 30.

reserves of natural gas and oil are important in the planning of the nation's energy policy.

Unfortunately, the Department of Interior lacks funds and manpower with which to conduct its own studies. Without independent data, the Department of Interior is unable to objectively and comparatively analyze resource estimates offered by oil companies. Past history has shown that such projections were far from being accurate.¹¹⁴ Discrepancies in resource estimates undermine long-term supply and demand projections.

Without sufficient data on which to base a rational long-term energy policy, one must seriously question the sensibility and necessity of leasing 10 million acres of the O.C.S. The Subcommittee's contention is that it is irrational to think that one can meet the demand without knowing what one's supply is. To lease and drill additional O.C.S. areas at a point in time when other resources are readily available by and through these producible shut-ins is very unwise. Moreover, because the cost of extracting our natural resources is increasing, it is more efficient to compel oil producers to utilize those tracts which are presently under lease and to utilize the present available equipment and manpower in development of those tracts.

¹¹⁴Id. at 33.

The Subcommittee found that the present leasing system was filled with numerous deficiencies that impaired the nation's ability to get its utmost out of its present energy supplies. Inadequate regulations and lax enforcement enabled oil producers' to obtain and control petroleum fields at bargain prices.

The subcommittee finds that the Department of the Interior's resource evaluation record is dismal. The existence of single bids on large numbers of tracts indicates that the government may not have received fair market value for lease under the Department's responsibility. The subcommittee finds that the deficiencies of resource evaluation are inexcusable. It feels that the Department's failure to obtain more reliable data by the simple expediency of requiring each applicant to agree to turn over all exploratory data to the Department as a pre-condition to receipt of an exploratory permit. This subcommittee finds that proposed regulations to accomplish this result have been in existence within the Department of the Interior at least since March of 1971, over three and three-fourths years.

The subcommittee finds that the Department of the Interior's proposed accelerated leasing schedule of 10 million acres leased in Calendar Year 1975 is of dubious quality. Thus, the subcommittee concludes that the selection of the 10 million acre goal is not related to the projected energy demands and anticipated supplies. ¹¹⁵

Based upon the testimony, evidence and findings the Subcommittee recommended that the Department of the Interior

¹¹⁵Id. at 30.

(1) immediately implement procedures to improve its resource evaluation capabilities, including improvements in its data base; (2) immediately implement procedures to improve its bid evaluation process to ensure fair market value is received for all mineral leases, especially on leases on which only a single bid is received. In addition, the Subcommittee urged that the Department of the Interior establish a time limitation on how long a lease can remain undeveloped or shut-in. Also, the Subcommittee felt that the Department of Interior should require verification that sufficient numbers of drilling rigs, drill pipe supplies, production platforms, and skilled manpower are adequately developed and available to assure O.C.S. tract lease and development. The Subcommittee also recommended that the F.P.C. coordinate its efforts with the Department of the Interior regarding producible shut-in leases to prevent arbitrary reserve withholding and to establish natural gas pricing policies which do not encourage reserve withholding in anticipation of higher prices. We concur in this recommendation.

We urge regulatory procedures which establish definitive guidelines by which a U.S.G.S. regional engineer may grant a producible shut-in classification. Without specific guidelines, the possibility of misjudgment can compound the problem of abuse of the system by oil companies. We must not allow the oil companies to withhold oil and gas production in anticipation of higher prices.

2. Secondary and Tertiary Recovery

The testimony of Dr. Richard Perrine, Chairman of the Scientific Advisory Committee provides an excellent summary of the potential for enhanced recovery of existing wells. Scientific Advisory Committee Analysis, infra, p.121. We believe that this alternative to O.C.S. development has been inadequately considered by Department of the Interior. We refer, briefly, to information readily available regarding this alternative.

The production of more oil from existing, ostensibly purged, wells should also be considered. According to the Ford Foundation's Time To Choose secondary and tertiary recovery from existing tertiary wells could be a major source of oil over the next decade. Sustaining the rate of expansion of energy use will not require major inroads in presently undeveloped offshore provinces before 1985, with most of the expansion coming from secondary and tertiary recovery from existing fields, Alaska, and additional offshore developments in the Gulf of Mexico. The technology to extract additional oil from wells is currently available and improved methods are emerging constantly, making this a viable supplementary alternative.

F. National Naval Petroleum Reserves: The Elk Hills Example

At a time when America is striving to achieve energy independence, serious efforts must be made to open the nation's proven, existing major petroleum reserves to full domestic production. Reserves which must be considered as energy alternatives to expanded O.C.S. development include Petroleum Reserve IV in Alaska, and Elk Hills. Although Elk Hills is a much smaller reserve than "Pet IV" in Alaska, we know far more about it, and thus we will use it as an example of the petroleum reserve potential that must be discussed in the E.I.S.

The petroleum reserve at Elk Hills was originally created to provide a readily producible supply of petroleum for use in time of national emergency. The United States Department of the Interior managed the field until 1923. Management of the field since 1923 has been the responsibility of the Secretary of the Navy. The present size of Elk Hills Oil Field is about 46,000 acres and present ownership is about 80% United States Navy and 20% Standard Oil Company of California.

With the exception of limited usage during World War II, Elk Hills has never been fully tapped. Instead, approximately 1,000 wells have been drilled by the Navy into the shallow zone of the area confirming the huge amounts of oil available. Estimates of potential ranges between 3 and 5 billion barrels of oil.

¹¹⁶California Energy Outlook, supra n. 93, at 3.

The reality is that there is no real justification for the Navy to continue to keep such product reserves. It is common knowledge that in times of military emergency, the military has first priority over all national energy supplies.

In a recent study,¹¹⁷ consumption figures show that the Department of Defense (hereinafter referred to as D.O.D.) consumes only three of four percent of the total energy produced on the continental United States and Alaska¹¹⁸ and that ". . . except for specialty fuels, the D.O.D. is an almost insignificant part of the market for gasoline, diesel fuel, and fuel oil."¹¹⁹

The D.O.D. consumes approximately 53.5 percent of all jet fuel produced in the United States. Jet fuel is produced by special contract.¹²⁰ If a military situation did arise, the curtailment of civilian flights would readily meet all additional jet fuel needs¹²¹ of the D.O.D. Thus, Elk Hills Naval Reserve is not, in fact,

¹¹⁷Fisher, George P., Desulfurization, First Draft, R & D Associates (May 30, 1973).

¹¹⁸Id. at 4.

¹¹⁹Id. at 4.

¹²⁰California Energy Outlook, supra n. 93, at 3.

¹²¹Perrine, Dr. Richard L., Professor and Chairman of Environmental Science and Engineering, Letter to Jan Chatten-Brown, Deputy City Attorney, January 14, 1975 at 1.

necessary for national defense.

Another compelling reason to open Elk Hills is its ready availability. At the present time, Elk Hills is capable of producing 60,000 barrels a day; within two months the capacity could be increased to 160,000 barrels a day; 230,000 barrels a day could be produced in 18 months and ¹²²within 3 years maximum production would be 350,000 barrels a day.

By contrast the earliest oil production from the proposed federal lease land in the Outer Continental Shelf will occur no sooner than the early to mid-1980's. Reliable projections predict that production of 300,000 barrels a day from the O.C.S. will not be realized until the mid-1980's -- that is, 7 to 12 years from now.

In terms of operational cost, it is economically more sound to open production at Elk Hills. To increase production capacity at Elk Hills will require an expenditure of approximately \$250,000 for each additional well that must be drilled, as well as additional expenditures to upgrade the pumping and refining capacities currently located in the project area. On the other hand, increasing production from the O.C.S. area will require the development of major offshore oil drilling platforms and wells, the estimated cost of which is \$200,000,000 each, with each well drilled on these platforms averaging approximately \$2,000,000.

¹²²California Energy Outlook, supra n. 93, at 3.

We believe that making the Elk Hills Oil Reserve available is a viable alternative to Outer Continental Shelf leasing for meeting our short term energy demands. In terms of cost, accessibility and production time, the decision to open Elk Hills would be well supported.

In his recent State of the Union message, President Ford supported the proposal to open Elk Hills Naval Reserve. With a new change in leadership of the House Armed Services Committee (the congressional committee that has traditionally had jurisdiction over this issue), the possibility for favorable passage of legislation which would open Elk Hills is within sight.

G. O.C.S. Development Cannot be Undertaken
Within the Proposed Time Frame

The draft E.I.S. does not address the pronounced problem of the ability of the oil industry to keep production abreast of the proposed increase in domestic production of crude oil due to shortages of drilling rigs, equipment and skilled manpower. The ability to develop the leases in the proposed time frame has great significance for an analysis of the feasibility of the Interior Department's decision to lease 10 million acres annually on the Outer Continental Shelf as a means of reaching domestic energy self sufficiency. Some doubt has been expressed as to the ability of the oil industry to achieve this seemingly desirable level of energy resource independence due to possible constraints in the supply of certain raw materials, equipment and manpower essential to the production and processing of crude oil.

This discussion is based on information obtained from two recent federal reports. The first was prepared for the Ad Hoc Committee on the Domestic and International Monetary Effect of Energy and Other National Resource Pricing of the House Banking and Currency Committee. It is entitled The Accelerated Development of the Outer Continental Shelf: Its Problems and Costs. The second is The National Ocean Policy Studies Report on the Outer Continental Shelf Oil and Gas Development and the Coastal Zone, prepared by the staff of the Senate Committee on Commerce. Both reports discuss the effects of

shortages of equipment and construction materials on the oil industry's future capability to develop the tracts. The reports indicate that, if shortages are found to exist at present, and are projected to continue into the near future, then substantial doubts must be raised as to the viability of the rationale behind an accelerated O.C.S. leasing program.

The Federal Energy Administration's Project Independence Report attempts to provide an in-depth evaluation and analysis of our domestic energy problem. According to this report, "Materials and equipment are fundamental to the development of energy resources. Current energy development is slowed by shortages of particular items and long lead times for certain categories of equipment. Although industry has traditionally responded in a time and manner commensurate with increased demand, there are certain capacity limitations that cannot be overcome in the short-run: drilling rigs ordered in 1974 cannot be delivered until the first quarter of 1977; oil company tubular goods are in tight supply, reducing a potential 171 Million feet that could have been drilled in 1974 to 160 million feet; manufacturers of walking drag lines are fully committed for deliveries through 1979." The major findings of this section of the report indicate that certain items have the potential of becoming significant constraints upon future O.C.S. development. These items include: fixed drilling platforms; mobile drilling platforms; oil company tubular goods; and steel products.

The "technical paper" on acceleration of the Outer Continental Shelf leasing by the Department of the Interior concurs with the Project Independence Blueprint findings that material and equipment shortages, current and projected, have the potential of hampering the success of the accelerated leasing schedule. The "technical paper" sums up the overall situation with regard to the supply of certain materials and equipment in the following statement:

"The availability of sufficient quantities of exploration and construction equipment is crucial to rapid O.C.S. development. Current shortages in drilling pipe and in onshore and offshore rigs may affect accelerated development of the O.C.S. if the situation does not improve. Production platforms and skilled labor are also in short supply."

According to Project Independence Blueprint, steel is the basic material for virtually all capital equipment in construction throughout the energy sector; heavy steel plate for pressure vessels and draglines, steel shapes for pumps and compressors, steel rail for transportation, and steel pipe and tubing are important in the use of steel within the energy sector. At present, short supplies of steel products such as pipes, tubing and casings are prevalent. These shortages surfaced as one of the consequences of the Economic Stabilization Program, during which time the steel industry cut back on production of low-profit items such as tubular goods. The Department of Interior's "technical paper" states:

The scarcity of drill pipe, tubing and casing has become critical in the past 8 months. Exxon expects to fall 20% short of its targets unless there is an improvement in supplies. Another major producer on the Gulf coast will be able to purchase only enough casing for 30 to 35% of this year's planned well.

As a result of this deficient supply of steel available in relation to demand, another serious shortage has developed with respect to production platforms. The components of such a platform, especially those composed of steel, are in short supply at present. The lead time required to manufacture a production platform is currently between 12 and 18 months. There is little possibility of increased production of these platforms in the near future because according to the "technical paper", "the utilization rate of current productive capacity is almost 100%".

The rotary drilling rig is the major piece of equipment used during the exploration and development of oil and gas fields, both onshore and offshore. The availability of these drilling rigs in relation to the projected requirements was found by Project Independence Blueprint to be one of the potential constraints that would have a negative impact on increasing domestic energy production. According to the Project Independence Task Force Report: "Higher petroleum prices have increased domestic drilling activity which, in turn, has increased the demand for drilling rigs. There is currently a short supply of rigs because long lead

times on raw materials and equipment are delaying their completion." This shortage can be directly attributed to the shortage of steel discussed in the preceding section and cannot be corrected until the steel industry is able to increase production and close the gap between the availability and requirements of steel products essential to oil and gas development. This finding, in view of the necessity of drilling rigs in exploration and development of any field, serves as a very strong argument in favor of reassessing the proposed accelerated O.C.S. leasing program. Without an adequate supply of drilling rigs, rapid development of even five million acres on O.C.S. would be impossible. This raises the question of what justification the Interior Department has for proposing the immediate sale of 10 million acres at this time, if the oil industry will be incapable of exploring and developing anywhere near that amount of acreage?

The availability of drilling platforms, both mobile and fixed, will be another potential constraint on the future expansion of domestic energy production. The F.E.A. Project Independence Report concludes:

The potential shortage of fixed and mobile drilling platforms is more acute than for any other material and equipment item. Even with optimistic assumptions or mobile platform production, and world fleet movement to U.S. waters, requirements under an accelerated development strategy exceed

projected availability by approximately 38%; the corresponding shortage for fixed platforms is 36%.

These projected deficiencies in platform availability are of great significance when analyzing the O.C.S. accelerated leasing strategy due to the essential role of these major pieces of equipment in any future O.C.S. oil field development. The report to the Committee on Banking and Currency has provided evidence that casts some doubt on optimism expressed by representatives of the oil and steel industries as to the future supply of steel and steel products. Basically, the potential problems are the availability of: 1) capital for capacity expansion, modernization and replacement; 2) energy; 3) raw materials; and 4) manpower. The report to the Committee on Banking and Currency does not share in the optimism expressed by oil and steel representatives. Rather, they conclude that current shortages in steel and steel products, and the threat of potential problems with capital availability and the supply of raw materials, raise definite questions as to the advisability of the federal government undertaking a program of accelerated leasing of O.C.S., such as that propounded by the Interior Department.

Another major problem facing oil companies is the critical shortage of skilled and professional manpower to design and operate increased production facilities. According to the National Ocean Policy Study, shortages of professional manpower are related to the uncertain leasing

policies of the government, which do not create incentives for students to major in petroleum and other relevant areas of engineering. Although the proposed O.C.S. development will create a demand for such professionals, there is at present a critical shortage which cannot be immediately filled. Oil companies apparently would not be ready to start exploration and production efficiently until the manpower is available. This shortage is but another reason to reevaluate the headlong rush to increase oil production on the Outer Continental Shelf.

H. Mitigation Measures Not Adequately Considered

Another deficiency of the draft E.I.S. is its failure to give adequate consideration to measures which would mitigate the potential adverse environmental effects of the proposed O.C.S. development. Mitigation measures not fully considered are: (1) immediate exploration of O.C.S. but delayed development and/or production; (2) priority in lease sales in areas farthest offshore; (3) camouflaging rigs; (4) subsea completions; and (5) commitment to more stringent drilling and production regulations. The relevance of each of these mitigation measures to the proposed O.C.S. development is discussed below.

Immediate Exploration But Delayed Development and/or Production

One mitigation measure is immediate exploration of the proposed lease zones but with no development, or, in the alternative, immediate development with well shut-ins. That is, potential oil reserves are located, but development and/or production do not occur until additional oil and gas are needed to satisfy estimated future energy demands.

The basis for this measure is that at the present time we may not need all of the oil and gas contained in offshore reservoirs. Restraining current development and/or production thereby conserves valuable oil and gas reserves

until some future time when our energy needs may be more urgent.

Immediate exploration with delayed development and/or production is a sensible mitigating alternative to immediate exploration, development and production. The draft E.I.S. fails to consider that alternative.

2. Priority in Lease Sales in Areas Farthest Offshore

Another mitigating measure is to give priority to lease sales in areas farthest offshore, thereby reducing at least temporarily the potential adverse effects upon highly valued coastlines. Production would move inland only when outer tracts containing sufficient quantities of oil are depleted.

Initial development of outer tracts has several advantages. According to the Bureau of Land Management, tracts recommended for the proposed Southern California lease sale extend 100 miles out to sea. These tracts would not be visible onshore, thus preserving aesthetic values. Also, deep water areas have proven to be far less sensitive to oil spills, while the distance from shore decreases the likelihood that oil spill containment efforts will successfully prevent beach contamination. The draft E.I.S. does not consider the mitigation measure of priority in lease sales in areas farthest offshore.

3. Camouflaging Rigs

Currently, oil companies are not required to camouflage offshore drilling platforms to reduce degradation of aesthetic values. Yet offshore platforms can be camouflaged to make derricks aesthetically more pleasing and even to reduce visibility to the onshore viewer. Camouflaging rigs is also technologically and economically feasible.

One device is thin milar plastic, aluminized on one side to create a mirror effect, which, when hung from the platform at an acute angle of less than 90 degrees, reflects only the ocean to an onshore viewer, thus disguising the platform entirely. Another method is the use of refractive devices to bend visible light so that persons viewing the horizon at water level see only the background and not the platform. Neither method would cause any navigational hazard.

Efforts to reduce adverse aesthetic impacts are not unimportant. Over 200,000 homes in Southern California have a view of the ocean. Many other persons come to the ocean for pleasure and solace. The draft E.I.S. does not consider camouflaging drilling rigs to mitigate interference with aesthetic pleasure.

4. Subsea Completions

Subsea production facilities represent a potential mitigation measure in that: (1) no drilling platforms would be visible, thereby preserving aesthetic values; and (2) no obstructions would occur on the surface, thus reducing the

danger to ship traffic and preserving recreational boating areas. The draft E.I.S. dismisses subsea completions because of greater economic costs and lack of accessibility in the event of blowouts, spills and other problems. Industry has not had extensive experience with subsea production facilities and thus the safety of such a method has not been demonstrated.

Several companies, however, have developed underwater production devices called subsea completion systems. According to the Western Oil & Gas Association (W.O.G.A.), there are currently six announced subsea production systems which are either being designed, constructed or field-tested in a marine environment. W.O.G.A. also states that within the past decade industry has made substantial progress toward subsea operations. Because of increased demand for such systems, a number are being developed and will be operational by 1980. More restrained development and production of offshore oil reservoirs would permit the utilization of subsea completion systems.

5. Commitment to More Stringent Drilling and Production Regulations

Another important mitigation measure is more stringent drilling and production regulations. Despite promulgation of O.C.S. orders designed to mitigate pollution and maximize platform safety, thousands of minor oil spills and five or six major spills of over 1,000 barrels have occurred since the

implementation of the new O.C.S. operating orders (Bureau of Land Management, Energy Alternatives and Their Related Environmental Impacts, 1973). The continued spillage suggests that the new O.C.S. orders are not sufficiently stringent or, alternatively, the orders are not adequately enforced. Due to inaccessibility, there are greater safety hazards associated with offshore drilling than for land operations. Special training of all offshore personnel to work with safety and anti-pollution devices is not only beneficial but essential. The Offshore Operations Committee, a joint effort of W.O.G.A. and the American Petroleum Institute, conduct classes which provide the following training: (1) knowledge of safety regulations of all applicable authorities; (2) specific instructions regarding operation of equipment and possible hazards; (3) orientation programs for personnel going offshore for the first time; (4) first-aid courses; (5) fire prevention and suppression technology; and (6) procedures and drills for general alarms which conform to United States Coast Guard rules and regulations. Strengthening existing O.C.S. regulations to include a mandatory training program of a similar nature would be an important mitigation measure.

Another mitigation measure would be stronger enforcement of O.C.S. regulations. Two recent studies found that U.S.G.S. did not enforce its orders to the fullest extent, but often issued only oral warnings about violators when

written notices or fines were appropriate. In view of the potential adverse effects upon the environment of a major oil spill, vigorous enforcement of O.C.S. orders is imperative.¹²⁴ O.C.S. leasing should not proceed unless a commitment is made to better enforcement. The draft E.I.S. does not discuss that critical mitigating measure.

123

National Academy of Engineering Marine Board, O.C.S. Resource Development Safety: A Review of Technology & Regulation for the Systematic Minimization of Environmental Intrusion From Petroleum Products (Dec., 1972).

124

Comptroller General, Improved Inspection & Regulation Could Reduce the Possibility of Oil Spills on the O.C.S., a report to the Conservation & Natural Resources Subcommittee, Committee on Government Operations, House of Representatives (June, 1973).

I. Failure to Consider Relative Environmental Effects

The relative environmental impact of O.C.S. drilling is not adequately addressed in the draft E.I.S. We recognize that the draft E.I.S. is not responsible for identifying and discussing all unique environments potentially affected by O.C.S. leasing. Yet lease sales are proceeding in specific areas without any knowledge as to what areas can best withstand the adverse environmental impact of O.C.S. development.

In our view, the type of reasoned, systematic decision-making mandated by N.E.P.A. requires a two-step approach on the matter of O.C.S. development. First, the necessity for, and consequences of, O.C.S. development must be analyzed. Second, if a decision is made that such a development is necessary, only then should a general environmental and resource analysis be made as to what areas of the O.C.S. are most appropriate for development.

We do not suggest that there can be drilling off Alaska, the Atlantic and the Gulf of Mexico, but not Southern California. We do suggest that an analysis of the relative environmental impacts of drilling various areas should be analyzed, and that no additional action in furtherance of drilling any area of the country should be taken until such an analysis is made. The Department of the Interior, on the other hand, has focused on particular areas for leasing and committed substantial resources to preparing for leasing without first answering the questions. Should there be leasing, and if so, where? We had assumed that the program E.I.S. would make at least some attempt to do a relative environmental impact analysis.

1. O.C.S. Oil and Gas - An Environmental Assessment
A Report to the President by the Council on
Environmental Quality, April 1974

The President's Council on Environmental Quality prepared an analysis of the Atlantic coast and the Gulf of Alaska which was released in draft as a preliminary report in April, 1974. Essentially, the report attempted to compare the relative environmental impacts of several possible drilling sites. The study first focused on a number of possible drilling sites in areas considered by geologists to be particularly promising for oil and gas discovery. The analysis proceeded to examine the potential impact on the marine environment of developing these sites as well as the predictable onshore impacts of industrialization and growth which will result from offshore production. The study also assessed the present oil and gas production technology and the institutional and legal mechanisms for managing O.C.S. development.

The basic premise underlying the conclusions and recommendations of the report was that the benefits of potential oil and gas development must be balanced against the risks of environmental damage. When the balance is favorable, development should proceed with caution and with a commitment to minimize the damage. When the balance is unfavorable the Council believes that development should not move ahead until environmental risks can be lowered to an

acceptable level.

The report does not purport to be a complete analysis of all the factors that might be considered. Rather, it is a broad assessment which can serve as a model that could be followed for proper O.C.S. development.

Areas are singled out as potentially productive on the basis of their favorable geology. Generally, such areas are characterized by thick geologically young marine sediments. But judgments based on such indirect geophysical techniques can only roughly estimate quantities. Exploratory wells may be necessary to discover whether commercial quantities of oil and gas are present.

Putting aside the ultimate question of which areas should be put into production, the decision should be made with a perspective on future energy needs and the growth of alternative or supplemental sources of power such as coal, geothermal energy, oil and gas from coal and shale, nuclear, and solar energy.

The effect of natural phenomena upon O.C.S. development should be given careful consideration, including general weather conditions, severe storms, earthquakes, and tsunamis. Such information is critical to O.C.S. structural design and to assessment of site acceptability.

We recommend the report of the Council on

Environmental Quality as a possible model for the Department of the Interior in the production of further E.I.S.'s relating to expanded O.C.S. development. The C.E.Q. report is not, however, a perfect model. We also recommend the critique of the C.E.Q. report by the National Academy of Sciences¹²⁵ contained in the appendix to the C.E.Q. report.

2. Factors Which Must be Considered in

Determining Where to Lease

As a specific example of factors which should be considered when the study of relative environmental impacts is prepared, we would like to draw attention here to the many varied and important environmental resources of the Southern California coast in order that due consideration and maximum protection be given to them.

The climate of the coastal plain of Ventura, Los Angeles and Orange Counties is one of the mildest in the United States, a fact which in part, is responsible for this area being the most densely populated in all of California. The high density of human population there places a heavy demand on environmental resources of the coastal region, and upon the resources of regions far beyond the coastal area. Moreover, geological structure, geographical location, and biological

125

Council on Environmental Quality, A Report to the President; O.C.S. Oil and Gas - An Environmental Assessment (April, 1974).

evaluation have combined to make the sea off Southern California one of the truly unique and productive areas of the world. A variety of habitats are present including estuaries, mud flats, sand beaches, bays, rocky shores, kelp beds, shelves, submarine canyons, basins, troughs, submarine sea mounts and islands. According to the report entitled "Southern

California's Deteriorating Marine Environment", prepared by the Center for California Public Affairs, western continental shorelines are upwelling coasts, and thus, being shallow to a great distance offshore, very fertile with a high potential for productivity. As an example, about 50 percent of the fish taken from the sea each year are caught on upwelling coastlines; however, only one percent of the area of the ocean is described as upwelling; comparatively, therefore, upwelling coasts are roughly 1,000 times more productive than other 99.9 percent of the ocean's surface.

Significantly, B.L.M. expects some accidental spillage of oil through the drilling and production process. According to the publication "Energy Alternatives and Their Related Environmental Impacts" prepared by the B.L.M., small spills between a fraction of a barrel and fifty barrels probably occur on the order of 1,000 times per year in the Gulf of Mexico. It is difficult to determine the potential impact from chronic low level spillage, but Max Blumer in Oil Pollution and Oil on the Seas states: "We are rather ignorant about long term and low level effects of crude oil pollution. I fear that these may well be far more serious and long lasting than the more obvious short term effects." (p.103) Larger

spills, although infrequent, are an established fact and a direct result of O.C.S. leasing. According to the draft E.I.S., O.C.S. production in the Gulf of Mexico alone from 1964 through 1971 resulted in a total of 10 major oil spills of 42 thousand gallons or more of crude oil in each spill.

The Draft E.I.S. states that degradation of water quality by routine operations will be slight and that brines added to sea water quickly diffuse into the water column. That assertion is refuted by the Bureau of Land Management's own publication Energy Alternatives and Their Related Environmental Impacts, which states on page 140 that the natural conditions of sea water will be altered and degraded in several ways during oil and gas operations. Debris and bilge will be released into waters from the many seismic vessels, crew boats, tugs, service and supply boats used throughout the operation. They also state that the production and discharge of formation waters (oil-field brines) is a potential source of pollution. Three properties of these formation waters which contribute to water quality degradation if released into the sea are: (1) the small amount of trained liquid hydrocarbons, (2) the high concentration of dissolved mineral salts, and (3) the absence of dissolved oxygen in formation waters.

The Draft E.I.S. acknowledges on page 310 of the second volume that the incidence of spillage of formation waters and drilling muds must be considered routine, after treatment for entrained oil. Estimates were developed that 75 barrels of formation waters per well per day and 12,000 barrels of mud per year would be disposed under accelerated leasing. For the

expected production of oil under this acceleration, according to the E.I.S., 8,500 barrels of oil will be spilled per year through routine operation.

The E.I.S. states that the most severe impacts that can affect the organisms and marine coastal ecosystems are those resulting from spilled oil. A report made by the Southern California Association of Governments points out that these impacts will be magnified in the frontier areas of Southern California, because ecosystems here are already stressed by natural seeps of oil and, in the Santa Barbara Channel, by already existing oil drilling operations. In addition, Southern California coastal waters are already polluted from a number of onshore domestic and industrial sources. Therefore, any impacts from spilled oil would increase the severity of impact on an ecosystem which is already so overloaded that the additional impact of either a massive oil spill or continuous small spills at a sublethal level may be beyond the natural recuperative powers of our ecosystem.

Interference with boating and ship navigation will be a significant problem in the coastal waters of Southern California due to the great numbers of recreational and commercial boats and ships presently navigating through the areas which have been proposed for O.C.S. drilling. The E.I.S. admits that oil platforms will constitute an obvious interference with ship navigation but then concludes that this interference is easily avoided and not particularly bothersome. We fail to see how this conclusion can be made when, navigating at night, and especially in rough weather, fog, and heavy seas, collisions with oil platforms are almost

inevitable. The only alternative to this danger would be the imposition of strict boating and shipping fairways which would seriously detract from the quantity and quality of recreational activities.

In Southern California, 80 percent of the population live within 30 miles of the coastline. Thus, the beaches serve as an invaluable source of recreation. The Draft E.I.S. feels that this interference with recreational activities merits but one page of discussion and finds that recreational curtailment is generally regarded by users as abusive. We feel that E.I.S. has drastically understated the importance of beaches as a recreational outlet. We consider California's beaches as one of its highest priorities for protection. An oil spill or a series of small accidental spills would directly affect shoreline activities such as sunbathing, swimming, diving, beachcombing, as well as scuba diving, boating, fishing, and water skiing. During warm months Southern California's beaches provide possibly the only relief from inland temperatures and heavy smog. Were its beaches to become fouled with oil, the repercussions would be enormous. This is a chilling thought when coupled with a statement from the publication, Energy Alternatives and their Related Environmental Impacts prepared by the B.L.M., that, "In any complex industrial operation involving heavy equipment, flammable materials, work at sea, and large numbers of employees, it is inevitable that accidents will occur." Were this to happen, the public benefit of added oil would be outweighed by the serious detriment of loss of use of our precious coastal resources.

Another significant yet briefly mentioned impact is the degradation of aesthetic values. The Draft E.I.S. states that it is possible that some portions of platforms, drilling rigs and other structures and transportation facilities of the oil and gas industry will be visible to a shoreline viewer. We submit that it will be impossible to avoid the sight of platforms and traffic save for periods of storm or fog. The E.I.S. states that visual effect would be considered adverse by some persons while the Western Oil and Gas Report goes so far as to say that tourism might increase due to persons coming to see the rigs. The draft E.I.S. properly concludes that the obvious significance of such degradation is a reduction in the quality of living for those people who dislike the sight of oil rigs near pristine shores. A fortiori, the more highly used areas like Southern California will have more people disturbed by this factor.

One of the most serious risks associated with O.C.S. drilling in the Southern California area is seismic activity. In regard to the tracts proposed for leasing, according to a statement of Western Oil and Gas Association, the seismicity is a more significant factor for the coastal shelf because these regions are seismically related to onshore fault components. The draft E.I.S. only briefly discusses the potential danger, noting that virtually all of the coastal areas lie within Zones 2 and 3, which pose the danger of moderate to major potential structural damage.

According to the Western Oil and Gas Association's Environmental Study, Areas A-1 and A-2, representing Santa Monica

Bay area and the San Pedro Bay area, are located adjacent to major faults. The San Pedro area has the greater seismic hazard because of the Newport-Inglewood fault. In fact, parts of this area, as projected for this assessment, are located near the epicenter of the Long Beach earthquake. The closer the structures are to this fault, the greater the risk of strong acceleration. According to the same study, area A-2 or Santa Monica has less risk than area A-1, but still may incur large accelerations. Although the Malibu fault has not been a source of major earthquakes recently, it is projected to have the capacity to generate large earthquakes. In addition, there are many subsidiary faults associated with it which are also active, especially to the west of the area. Moreover, all the faults have primarily thrust components, which produce relatively high acceleration or ground motion.

In addition to ground motion, there are other hazards resulting from seismic activity. The most important of these is fault rupture and displacement. Most of the faults in the Southern California area have a potential for fault rupture which may be due to small earthquakes on the fault or possible motion from a larger, more distant, earthquake.

Two other hazards associated with seismic action are liquefaction and tsunamis. Liquefaction is seismic-induced mobility in loose saturated sediments which can cause failure of the sediment on the sea floor. Seismic activity can generate sea waves or tsunamis. Although most tsunamis are from distant earthquakes, some local events, especially on the Santa Barbara Channel, have generated small waves. Due to this dangerous phenomena, drilling locations should be chosen with awareness of the possibility of earthquakes on or near a platform or oil pipeline.

There are desirability rankings in the E.I.S. for various proposed O.C.S. areas throughout the nation. Southern California generally places at number 4 or 5 depending on the ranking. There are no rankings of potential environmental impact. If there are areas of high environmental risks, then those areas should not be developed before areas of lesser risk are fully utilized -- even if they have less oil.

J. Degradation of Air Quality

Increase of offshore activity necessarily leads to increased onshore development because of the necessity of support facilities. An onshore activity with significant effects on air quality is the construction and expansion of oil refineries. California presently has 34 refineries with an estimated crude oil capacity of 1,852,000 barrels/day.¹²⁶ 15 refineries are located in the South Coast Region with a total capacity of 1,012,000 barrels/day.¹²⁷ Ten of these refineries are located in coastal regions.

Increased demand for petroleum products, anticipated imports from the Alaskan North Slope and possible O.C.S. leasing will increase pressure to construct new refineries along the West coast. Economic considerations including major capital requirements for equipment, construction labor and material cost, land value and accessible markets, enhance the probability that new refineries will be located in the vicinity of large metropolitan markets.¹²⁸ In fact, 12 refinery projects have been proposed for construction in California.¹²⁹

126

Calif. Energy Outlook, supra n. 93, at 3.

127

South Coast Regional Commission, Energy, California Coastal Zone Conservation Commission (October 28, 1974), at 175. Hereinafter cited as Calif. Coastal Zone Report.

128

Radian Corporation, Final Report, A Program to Investigate Various Factors in Refinery Siting, submitted to Council on Environmental Quality and Environmental Protection Agency (February 15, 1974) at 54. Hereinafter cited as Radian Report.

129

Calif. Coastal Zone Report, supra n. 127 at 117.

Refineries are considered by E.P.A. to be a stationary source; that is, a source which emits a number of effluents to the ambient air. Refineries emit 5 major pollutants; sulfur dioxide, particulate matter, nitrogen dioxide, carbon monoxide and hydrocarbons.¹³⁰ Construction of refineries in Southern California will have a significant adverse impact on present air quality. Increased onshore activities such as refinery construction, production, increased manpower, vehicular traffic, etc., are major factors in evaluating the environmental impact of O.C.S. development. Such threats to air quality are not adequately discussed in the Draft E.I.S. Four pages are devoted to a superficial presentation of air quality in Northern, Central and Southern California. No mention is made of related onshore development and anticipated degradation of air quality in nearby areas.¹³¹

¹³²
A recent study by the Radian Corporation analyzed the environmental ramifications of refinery construction and production. A large new refinery with a production capacity of 200,000 barrels/day was selected as a model for study. A typical refinery consists of a combination of standardized unit processes. Each unit process contains equipment to perform a refining operation on whole crude, or a fraction of the crude. These refining operations include separation by fractionation, conversion by catalytic

¹³⁰ Radian Report , supra n. 128, at viii.

¹³¹ The Draft E.I.S. , pp. 104-108.

¹³² Radian Report , supra n. 128, at i.

reaction to more desirable or higher quality products, product treating processes, and auxiliary operations for such purposes as by-product control, storage and others. Ambient air emission estimates were prepared for each of the unit processes.¹³³

Sulfur dioxide is emitted from refineries as a result of burning fuels containing sulfur of both gaseous and liquid fuels. If the sulfur content is minimized, the resulting sulfur dioxide is minimized. Modern control technology does exist which can control emissions. Gaseous fuels can be treated with an absorbent. Sulfur can be removed from liquid fuels by hydrodesulfurization treatment.¹³⁴

Nitrogen dioxides are a component of flue gases which are released during the furnace and power plant boiler stages. Generally, nitrogen dioxides can be controlled by combustion control design features such as two-stage combustion or off-stoichiometric firing. One exception is the ethylene plant. High flame temperatures are required by this process, precluding combustion modification. Uncontrolled emissions of nitrogen dioxides are a result.¹³⁵

The "cat" cracker is a significant potential source of particulate matter and carbon monoxide. The catalytic cracking process converts heavy distillant oils (typical boiling range of

133

Id. at iii An analysis of waste water effluents was also included but is not discussed in this presentation.

134

Id. at 193.

135

Id. at 194.

650° to 900° F.) into petroleum fractions of lower boiling range and of correspondingly lower molecular weight. If the refinery installed the best available control devices, particulate matter and carbon monoxide emissions could be contained within federal standards.¹³⁶

However, the Radian study discovered that even if the best control devices and good maintenance procedures were followed, hydrocarbon emissions would be in excess of federal standards by a factor of 20 to 40.¹³⁷ Hydrocarbon leaks were found throughout the refinery and storage areas and especially around pumps, valve glands, and flange areas.¹³⁸

A violation of the hydrocarbon standard by itself is not reported to constitute a public health hazard, but photochemicals formed by hydrocarbons do constitute a hazard to the public's health.¹³⁹ "The major air pollution problem in California is photochemical air pollution (smog) which is caused by atmospheric reactions of hydrocarbons and oxides of nitrogen in sunlight."¹⁴⁰

The Radian Study reports that the estimated impact of a 200,000 barrels/day refinery upon ambient air quality can be significant. Hydrocarbon emissions will cause the refinery to

136

Id. at 194.

137

Radian Corporation, Technical Memorandum: Some Environmental Considerations in the Petroleum Refining Industry (March 13, 1974), at 22. Hereinafter cited as Radian Corporation Study.

138

Radian Report, supra n. 128, at 195.

139

Radian Corporation Study, supra n. 137, at 22.

140

Air Resources Board, Air Pollution in California: Annual Report 1973 (January, 1974) at 6. Hereinafter cited as Air Resources Report.

exceed the primary air quality standard. Other emissions will not exceed federal standards ¹⁴² if refineries install the best available control technology.

The fact that other emissions may not exceed federal standards does not mean that refineries are not major pollution contributors. The Study cautions readers to consider the impact of the refinery on the surrounding air quality and not the surrounding environment on the refinery.

If a sufficient quantity of these pollutants (sulfur dioxide, carbon monoxide, particulate matter, nitrogen dioxide) is emitted by other sources in the vicinity of the refinery, then federal ambient air quality standards will be exceeded. That is, the refinery could contribute to the violation of federal ambient air quality standards even though the emissions from the refinery do not violate the standards in and of themselves. ¹⁴³ (emphasis added)

This finding is particularly important in considering the environmental impact of additional refineries in Southern California. The South Coast Air Basin now produces 38% of the ¹⁴⁴ total tonnage of air pollutants in California. Large quantities of man-made pollutants are emitted into the atmosphere each day. Based on 1972 studies, the following table shows the emissions of major pollutants on a daily basis in Southern California as

141

Radian Corporation Study, supra n. 137 at 22.

142

Id. at 22.

143

Id. at 22.

144

Air Resources Report, supra n. 140 at 6.

well as in the entire state: ¹⁴⁵

<u>Major Pollutant</u>	<u>Southern California</u>	<u>State of California*</u>
	(tons per day)	
Nitrogen oxides	1,444	3,800
Hydrocarbons	2,242	5,900
Carbon monoxide	9,120	24,000
Particulate matter	722	1,900
Sulfur dioxide	376	990

A consulting firm, K.V.B. Engineering, Inc., recently reported ¹⁴⁶ its findings on South Coastal Air basin emissions. The K.V.B. study estimates that stationary sources (including refineries) contributed ¹⁴⁷ 28% of the total emissions during 1972. Furthermore, refineries were estimated to contribute more than 100 tons/¹⁴⁸ day of nitrogen oxide emissions found in the Los Angeles Basin.

There is little doubt that the quality of air in Southern California is far from reaching primary ambient air quality standards. Though some reduction of hydrocarbons and carbon monoxide emissions have been achieved, this trend is forecast to be re-

¹⁴⁵ Id. at 13.

¹⁴⁶ Los Angeles Times, January 19, 1975 at Part II, page 1.

¹⁴⁷ Id. at 1.

¹⁴⁸ Id. at 3.

* A computation of 38% was calculated against each of the reported figures.

versed as a result of stationary sources switching from natural gas to oil for fuel. K.V.B. indicates that nitrogen dioxide emissions will increase by 15% by 1980.¹⁴⁹

The gloomy forecast does not take into account a possible increase in crude oil refineries. Yet, if O.C.S. leasing is approved, the demand for refinery construction will result in expanded refinery facilities. Such activity will undoubtedly result in further degradation of present air quality and pose an undue burden upon local residents who must work and live in a polluted environment.¹⁵⁰

¹⁴⁹ Id. at 3.

¹⁵⁰ Air Resources Report, supra n. 140, at 7.

K. Insufficient Data for Environmental Analysis

The E.I.S. is replete with statements that data is not available regarding marine and coastal resources, as well as the potential impact of O.C.S. development on these resources. As indicated previously, we believe that the Department of the Interior has an affirmative obligation to develop the data necessary for evaluation of the full impact of O.C.S. development.

Below is a list of specific areas where the E.I.S. admits a lack of adequate data. In those instances where we have discovered literature sources of data already available, we have so indicated. Where we do not indicate alternative literature sources, it does not mean that such sources are not available, but only that with our limited time and resources we did not discover them.

1. "There are large gaps in the scientific information that cause problems in analyzing and predicting the impacts of O.C.S. Oil and Gas Development." P. 128 of Draft E.I.S.
2. "Though all predictions imply uncertainty, it is rational to assume a continuation of the secular growth in G.N.P. and, hence, a corresponding rise in aggregate energy consumption." P. 145.

3. "It is important to point out that predictions of effects at the community, or even population, level cannot be determined from existing literature....Quantifiable comparisons are not possible in these areas due to a scarcity of quantification of population levels and dynamics preceding the spills." P. 157. Data available in Oil Pollution and the Public Interest, A Study of the Santa Barbara Oil Spill, by A.E. Nash (1972)
4. "Consequently we cannot predict in a truly quantitative manner what the impacts of offshore drilling will be in newly opened areas." P. 159. Data available in Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to 1965 Santa Barbara Spill, prepared for California Attorney General, by U.R.S. Research Company.
5. "It is difficult to predict how pipeline burials, access channels necessary for construction equipment, and dredge spoil banks affect communities." P. 160. Data available in The Santa Barbara Oil Spill in Prospective, by N. Nicholson of California Cooperative Oceanic Fish Investigation Report (1972).

6. "It is difficult to predict whether new refineries will result from the proposed increase in acreage leased." P. 161. Data available in California Energy Outlook, 1974 to 1975, prepared by The California Energy Planning Council; The Accelerated Development of the O.C.S.: Its Problems and Costs, Report for House Committee on Banking and Currency (1974).
7. "The natural (chemical, physical, and bacteriological) degradation of crude oil is a complex and not well understood process." P. 162. Data available in Southern California's Deteriorating Marine Environment, R. C. Fay for Center of California Public Affairs (1972).
8. "Little information has been found concerning the effect of crude oil on the zooplankton." P. 165. Data available in Oil Spills and the Marine Environment, by Boesch, Hershner, and Melgram (1972).
9. "Chronic pollution from offshore production sights represents an unknown factor." P. 168. Data available in Southern California's Deteriorating Marine Environment, supra.

10. "We believe that the plankton of populations in the various geographic areas will be able to absorb the impact of a major oil spill and recover fairly rapidly. This is based partly on the lack of evidence that plankton populations are catastrophically impaired by oil spills."
- P. 169. Data available in Santa Barbara Oil Spill: Short Term Analysis of Macro-Plankton and Fish, A. W. Ebeling for Environmental Protection Agency 1971.
11. "No information has been found on the effect of spilled oil on numbers of the plankton other than fish." P. 175
12. "The effects of the sublethal concentrations of oil on salmon migrations are unknown but potential for harm is clear." P. 174
13. "Of more importance is the effect on marine life due to chronic low level pollution by different substances including oil. This problem remains an unanswered question." P. 186. Data available in Environmental Assessment Study of Proposed O.C.S. Leases, by Dames and Moore for Western Oil and Gas Association, Volume 3.

14. "Although we have no conclusive evidence, it is our opinion that a major oil spill would effect sport fishing adversely." P. 217

15. "It is impossible to quantify the possible impact of an unpredictable event such as a major oil spill on beached and shoreline recreation."

P. 256. Data available in Physical Assessment and Clean-up - Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to 1969 Santa Barbara Spill, prepared for California Attorney General by U.R.S. Research Company.

16. "The impact of exhaust emissions is unknown, but considering the small total horsepower requirements it is thought to be small." P. 260. Data available in A Program to Investigate the Various Factors and Refineries Siting, by Radian Corporation, Texas.

17. "Water quality could be further degraded as the result of accidental oil spills, but the degree of degradation is impossible to predict." P. 264. Data available in Hearings before National Ocean Policy Study: Oil and Gas Development and Coastal Zone Management Serial No. 93-99.

18. "It is impossible to quantify the effects of this proposed program, or even the present program, on the organisms themselves (Commercial fish and shell fish)." P. 274. Data available in Santa Barbara Oil Spill: Short Term Analysis of Macro-Plankton and Fish, supra.
19. "The additional stress which the ecosystem can absorb is limited, but at present, the bounds of these limitations are not known." P. 318. Data available in Southern California's Deteriorating Marine Environment, R. C. Fay for California Center for Public Affairs.

Although the Department of the Interior contends that baseline data is needed only to monitor O.C.S production, we believe that a certain basic knowledge of our resources is essential if we are to have a useful analysis of the impact of oil and gas production. In additon to the analysis provided by our own Scientific Advisory Committee, presented infra, we wish to set forth the assessment of current information developed by the Southern California Academy of Sciences, an organization under contract to B.L.M. for developing scientific data.

In late 1974 B.L.M. asked the Southern California Academy of Sciences to assemble scientists with expertise in the fields of chemical, geological, biological and physical oceanography in order to evaluate the need for baseline data on the

Southern California marine environment. A conference was scheduled to propose recommendations to B.L.M. for a meaningful and scientifically adequate baseline study. Based upon said data B.L.M. would then ask the Southern California Academy of Sciences to make findings as to the long term environmental effects of off-shore drilling on marine life.

Originally B.L.M. indicated that it wished to fund a 30 day study in order to gather pertinent data. However, the results of the conference indicate that a minimal study period for some disciplines (physical, geological, and chemical oceanography) is one year. Three to five years is considered essential by marine biologists in order to collect sufficient data on invertebrates and vertebrate species. The disparity in time estimated may be attributed to the scientists' evaluation of the present state of knowledge. At the 3 day conference held December 5,6,7, 1974, scientists continually expressed their concern with the lack of sufficient data with which to make a scientifically valid estimate of the effects of offshore drilling on marine habitats.

The depth and breadth of the proposed studies indicate the dearth of information about the Southern California Outer Continental Shelf that presently exists. Knowledge of the O.C.S. is characterized as being sparse and synoptic; that is, it is not uncommon to find intermittent scientific studies with little or no connection to each other. As a result, the scientific community does not have information which has been synthesized and

evaluated over an established period of time to yield cohesive and reliable data.

For instance, physical oceanographers indicate that little is known about subsurface movements. Such knowledge is essential because it relates to vertical and horizontal dispersions of pollutants. Little data has been accumulated on the effects of surface winds on ocean current and flow. Such information is basic to the understanding and prediction of dispersion of pollutants and the effects of oil spills on marine life.

Marine geologists acknowledge that there are extensive information voids as to seismic safety and the ramifications of offshore drilling. Basic information, such as bottom samples, sea force stability, and geological composition of the O.C.S., is insufficient to answer such essential questions as: What are the engineering and physical properties of the outer continental shelf and proposed lease land? Do these properties constitute a hazard to potential oil drilling? To what extent is the sea floor modified by depositions and sedimentations?

Marine biologists urge extensive habitat studies which would provide data as to the variety of flora and animal life present along the Southern California O.C.S. To this date, research has not been conducted to determine tolerance and resistance levels of dominant organisms or groups of organisms and major habitats, to the presence of relevant levels of oil, heavy metals or other substances likely to enter the sea as a result of oil and gas development.

Chemical oceanographers strongly recommended an extensive study of the chemical ramifications of offshore drilling. Basic information regarding the total amount of hydrocarbons should be ascertained for indicator species in the pelagic and the benthic fauna and flora as well as for the suspended particulate matter and sediments. Specific compounds should be identified, monitored and measured depending on the nature of the resource being developed. Determination of trace metals in sea water and sediments should be investigated, particularly barium, mercury, molybdenum, nickel and vanadium.

The hesitancy of the Southern California Academy of Sciences to make any evaluations as to the ecological effects of offshore drilling until extensive studies have been conducted support the conclusion that the scientific community presently lacks sufficient and reliable data on which to base a critical analysis.

In order to illustrate the extensive proposed recommendations of the Southern California Academy of Sciences, the following is a summary of the recommendations of each discipline as it was presented to the Department of Interior.

1. Geological Oceanography

Seismic activity studies are crucial for safe drilling. Little knowledge appears to be available about Southern California's marine faults though we do know this is a very active area. Recently, the United States Geological Survey (U.S.G.S.)

returned from one of its first exploratory trips in the Cortes Bank (which is located in the proposed federal lease land). During this exploration trip, it was able to obtain geologic samples which would assist in determining surface sediments and sediment distribution. However, the results of this report will not be available until early Spring 1975. U.S.G.S. marine geologists suggest that various studies be conducted in order to provide vital and necessary information.

Scientists suggest increasing the present seismic monitoring system in the Continental Borderland. This increase should include the placing of bottom seismometers on selected banks, in particular the Cortes Bank. Also, to supplement seismic records, high resolution profiling, seismic retraction, gravity and magnetics should also be conducted.

Various core sample studies should be conducted in order to determine the stratigraphic composition of the Continental Borderland. Box core samples with printed photographs of bottom conditions are preferable. Gravity cores should be used where box cores are not feasible and where the engineering properties of sediments at moderate depths are needed.

Three hundred meter holes should be drilled where deemed necessary to detect evidence of instability. Holes of greater depths than 300 meters would require the U.S.G.S. to file an environment impact statement with E.P.A.

At least one deep basin should be drilled and cored

in order to compile as complete a stratigraphic record as possible. This record will provide concepts on the rate of deformation, tectonic activity, sediment influx, biotic production and bottom conditions, including base information.

A broad-based widely-spaced (20 kilometers) geophysical survey should cover the Continental Borderline for a preliminary survey. The completion of this survey would probably fill in the gaps in existing data. This general work at the surface at about 4 knots and 10 160 KJ will incorporate a 3.5 KHz profiler, side-scan sonar sniffer magnetometer and gravimeter.

A detailed closely-spaced 5 km geophysical survey would cover selected target areas where potential resources are thought to be, and platforms and pipeline right of ways are to be investigated. The deep tow package detail work (in deep water) at about 1/2 knot will incorporate a 3.5 KHz profiler, side-scan sonar, television monitor, bottom photography and sniffer. High resolution profiling should be done to determine hydrocarbon occurrences.

Transmissometer studies and suspended sediment studies should be done to determine the suspended sediment displaced and depositional patterns.

The following questions ask for information considered essential to the assessment of environmental hazards of offshore drilling. A large-scale base line data collection and monitoring program is recommended.

1. Does sea floor instability (seismic, slumping,

liquefaction) pose a potential hazard?

- (a) What are the physical and engineering properties of the seabed material (grain size, degree of consolidation, sheer strength, clay minerals, etc.)? In order to make such a determination, bottom sediment sampling programs including orientated box core and gravity cores (grab samples to be minimized), detailed age dating techniques, physical dating techniques, should be emphasized.

Bottom photography should also be conducted.

- (b) Do these properties constitute a hazard? To answer this question the following studies should be conducted: a bottom sediment sampling program, including orientated box core and gravity cores, detailed age dating techniques and physical dating techniques, should be emphasized over paleontology and bottom photography.

- (c) Is there evidence of instability, e.g., slumping at present? To make this determination, one must conduct bottom sediment sampling programs, core hole programs (300 meter drilled holes), bottom photography, high resolution reflection profiling (3.5 KHz), detailed age dating techniques, physical dating techniques, seismicity and

side-scanning sonar.

- (d) What are the physical and engineering properties of the uppermost rocks beneath the unconsolidated sediment of the seabed, cementation, degree of induration, extent of fracturing, grain size, sheer strength and geologic age? This would involve conducting core hole sampling tests, bottom sediment sampling programs and age dating technique programs.
- (e) Has tectonic uplift or subsidence contributed to potential instability (high slope angles, evidence of recent uplift, and active fault traces)? Again, the following tests should resolve this particular question: high resolution reflection, profiling, reflection seismic test (air gun, sparker, etc., multi-channel digital processed seismic data highly desirable), and core hole programs (300 meter drill holes).
- (f) How common and of what magnitude are earthquakes in this area? This involves the issue of seismicity.
- (g) Are overpressurized gases likely to occur? Again, in answering this question we must take into consideration the following tests:

hydrocarbon occurrences; location, identification and quantification using high-resolution profiling, side-scanning sonar, sniffer (continuous water sampling-gas chromatographic analysis), and bottom sediment sampling analysis seismic amplitude data, "bright spot", reflection seismic tests, high resolution reflection profiling.

2. To what extent is active faulting likely to be a hazard to offshore development?

- (a) What is the distribution of faults in this area? Here reflection seismic tests and high resolution reflection profiling would provide relevant data.
- (b) How recently have there been displacement on faults, dating and rates of displacement, etc.? Core tests and the age dating techniques including physical dating techniques will be relevant here.
- (c) What is the seismic history of the area? Again, this goes to the issue of seismicity.
- (d) What is its present seismicity? Additional stations are needed on Santa Barbara Island and Santa Catalina Island.
- (e) What are the predictions of seismicity and

seismic risk? In order to answer this question the following tests must be conducted: seismicity, reflection seismic tests, high resolution reflection profiling, core hole programs, detailed age dating techniques and physical dating techniques.

3. To what extent and degree is the seafloor modified by erosion and deposition?

(a) What are the unconsolidated sediments [grain size, current indicators, (e.g. ripples, etc.,)] and precise dating of recent sediments? Here bottom sediment sampling programs, including orientated box core and gravity holes, high resolution reflection profiling, detailed age dating techniques, current meter stations on and near bottom, long term measurements over minimum 14-day periods, bottom photography, seismicity, and side-scanning sonar.

(b) What are the external stresses exerted on sediments, including distribution efficacy? bottom currents? turbidity flow potential? waves? internal waves? tsunami action? Here current meter stations on and near bottom, and long-term measurement of current over

minimum 14-day periods will be necessary.

4. Are potential contaminants present? If so, their identification, release, dispersal, and areas of accumulation must be identified.
 - (a) What is the source and distribution of any recognized toxic trace elements? Use of bottom sediment sampling program for hydrocarbon occurrences, and location, identification and quantification using high-resolution profiling are necessary tests.
 - (b) What is the source and distribution of hydrocarbons, gas and oil seeps, shallow currents, etc.? Studies involving hydrocarbon occurrences, and location, identification and quantification using high-resolution profiling, side-scanning sonar, and sniffers would yield relevant data.
 - (c) What is the suspended sediment dispersal and dispositional patterns? Here tests using the transmissometer studies and suspended sediment studies (using water column data required in conjunction with the study) are necessary.
 - (d) What is the recent dispositional history of sediments in this area? Detailed age dating

techniques, bottom sediment sampling programs and high resolution reflection profiling would be of assistance.

- (e) Have the activities of man already significantly altered the natural environment (toxic metals, effluent, sediment distribution, etc.)?

2. Biological Oceanography-Invertebrates

The proposed study includes the following subjects:

(a) Habitat Surveys

The proposed lease sites are all located on ridges; thus general habitat types are likely to be similar and detailed work should begin on the least known areas such as:

- (1) the outer most areas,
- (2) the northern channel island area,
- (3) the Santa Barbara Island and Santa Catalina Island areas, and
- (4) two in-shore areas.

A broad general survey of the region, including satellite and/or aerial photography using remote sensing techniques, or apparatus such as "deep-tow" (a package towed by a ship and including a side-looking sonar magnetometer, television, and cameras).

This survey should provide a fairly detailed picture of the variety and distribution of major sea bottom types and habitats.

(b) Studies of Organismic Diversity,
Distribution and Abundance.

Four major groupings of habitats need study in or near each of the potential lease sites:

- (1) intertidal
- (2) shallow subtidal
- (3) benthic
- (4) pelagic (at all depths)

Surveys need to be made in each major habitat. Such a survey should include the variety of plants and animals present and the spatial and temporal distribution of the most significant of these organisms. Significance should be determined on the basis of numbers, biomasses, positions, as well as food chain and direct economic value. A determination should also be made as to the relative abundance of these significant organisms.

The purpose for conducting such surveys is to determine the present state of animal and floral life in these general and major habitats. The present state of knowledge is very sparse. It is of vital importance to evaluate the general habitats in question.

The area south of Point Conception serves as a major

biotic region for the Pacific Ocean; its coastal line is complex and varied, thus creating numerous types of habitats attracting different types of animal and plant life. The region south of Point Conception to the Gulf of Mexico also acts as a transition region for many varied species because of its temporal variations. Numerous subcultures exist at the bottom of ridges and valleys which are supported by the various and diverse flora. Thus the area which is included in the proposed federal lease land serves as a major biotic area in relation to the food chain and production of invertebrate species.

(c) Studies of Ecological Dynamics

Laboratory studies are needed to develop understanding of food chains in different habitats and to determine tolerance and resistance of the dominant groups of organisms in the major habitats to the presence of relevant levels of oil components, heavy metals, or other substances likely to enter the sea as a result of oil and resource development.

Laboratory studies must be conducted in order to determine the effects of such substances on the dominant organisms in relationship to rates of growth, longevity, fecundity, nutrition, and pathology. Studies should also be conducted in order to determine the effects on other organisms in the food webs of feeding upon organisms containing high body-burns of importance substances, such as hydrocarbons.

(d) Time Frame for Completion of a Study

A five year study is needed according to the scientific community for an adequate baseline study. The time frame includes start of time, three full annual cycles, each cycle including quarterly replicated analysis of floral and faunal surveys as described. It also includes data reduction, calculations, annual and final (published) report. The time frame does not include the continuing monitoring program which must follow this initial program to keep track of after-effects of oil developments.

The above described study is a minimal study which would include all of the components needed for a scientifically adequate, accurate, and reliable set of conclusions. It would provide a reasonable basis for predictive statements concerning possible effects of oil and resource development. It would also provide a sound foundation for assessment of the actual effects of whatever oil and resource development in fact takes place. Anything significantly less complete than this study will not constitute a scientifically adequate program.

3. Biological Oceanography-Vertebrates

The vertebrate species is one of the most sensitive to visible measures of contaminants in chlorinated water. In order to determine how a potential catastrophe such as an oil leak would effect marine life, more data must be gathered on the present numbers of various vertebrate species in Southern

California.

Replicated efforts are needed as all features that should be studied are in some degree of continual flux. Over a minimum 3-5 year study, however, a great deal of information can be obtained by annual cyclic and quarterly studies. Data gathered prior to the base-line studies should be incorporated in order to determine historical trends. Schedules should be arranged to take optimum advantage of breeding period, especially for birds and pinnipeds.

(a) Ship Operations

Two rather different sorts of ship operations are needed. First, ground truth (or "water truth") ship activity will be necessary in order to obtain data regarding (a) species identification from the air, (b) siting frequency of bird flocks or marine mammal schools, (c) number of animals reported and (d) correlation with marked animals obtained. The second ship operation will involve the capture, tagging, stomach analysis and tracking of animals. The ship will catch, lavage (obtain stomach samples of food and parasite analysis) by non-harmful means, freeze-brand, attach dorsal fin rototags and release animals concerned.

Considerable reservoirs of skillful and interested lay observers exist in Southern California. While for marine mammals highly trained professionals are recommended (because security of identifications is often difficult for many species),

groups might be invited to submit plans for work on certain species. For example, lay persons might describe the passage of certain migratory species such as the grey whale, the hump-back whale and the killer whale. Similar contributions for the bird program might come from organizations such as the Audubon Society.

(b) Marine Mammals

A survey must be conducted in order to determine the abundance and distribution of marine mammals. A once-monthly base line transect is needed using an aircraft and a strut or belly-mounted aerial camera assemblage. Haul-out and rookery grounds must also be overflown and photographed regularly. Most cetaceans and pinnipeds should be identified by species. Data gathered should be broken down as to school, locality, shape (feeding or traveling aggregation), resting or moving group, time of day and species.

Species of special importance will be chosen to be equipped with dorsal fin or harness radio tags for tracking by boat and air. There are four various types of visual tags. First, the plastic dorsal fin rototag may be attached to porpoises and whales. Secondly, the freeze bands may be attached to marine mammals without any harm to the animal. The last two types are spaghetti tag and laser-branding.

A survey must also be done of beached animals. The number of beached cetaceans and pinnipeds has

proven to be an indication of the health of a population. A monthly survey of selected searches of mainland and island shoreline is essential to determine the "normal" number of animals washed ashore. Causes of death and parasitic loads can be approached by sampling such dead animals and is recommended.

(c) Birds

Surveys of abundance and distribution should be made in conjunction with the marine mammal surveys using aerial censusing. Breeding colonies must also be overflown and photographed regularly. Birds may be identified to species, more often to genus and family. Data should be broken down into flock size, locality, time of day and species composition.

A key element in maintaining surveys of vertebrates is the measure of reproductive success in representative colonies several times within a breeding season. This is necessary in order to determine the number of young raised per pair and, if reproductive failure is found, to determine at what stage it occurs. Related to this effort, measures of hatching failure, chick mortality, and residues of DDE, PCB and petroleum hydrocarbons should be obtained.

4. Chemical Oceanography

Geographically, it is necessary that the study area extend beyond the proposed Federal lease land. The minimum

area to be studied should extend throughout the Southern California bight. (The bight extends from Point Conception in the north to just south of the United States-Mexico boundary.) The following is a list of specific recommendations that must be followed in order to provide sufficient data to predict the ecological effects of offshore drilling on marine habitats:

(a) The total amount of hydrocarbons should be ascertained for indicator species in the pelagic and benthic fauna and flora, as well as in the suspended particulate matter and sediments.

(b) Specific compounds should be identified, measured and monitored, depending upon the nature of the resource being developed.

(c) Interfaces should be investigated, including sediment/water and water/air, including the dissipation and degradation of specific compounds.

(d) Isotope methods should be utilized to determine the ratio of hydrocarbons to distinguish biogenic gases.

(e) Analysis of samples to be undertaken on a quarterly basis.

(f) Determination of base metals in seawater and sediments should be investigated, particularly barium, mercury, molybdenum, nickel and vanadium.

(g) Determination and measurement of trace metals in pure water should be investigated, mobilization and precipitation of metals into the sediment should be studied.

(h) All sediment analysis of trace metals must be

intercalibrated.

(i) Slow-entry and/or clear-vented box coring techniques are recommended for sampling the surface sediment. Commonly used gravity, box, and piston coring techniques are not recommended.

(j) All trace metal samples must be obtained and determined from undisturbed sediments, and from water column particulates in basin and slope regions adjacent to lease sites and on the bank lease sites as well.

(k) Trace metal content of selected fauna and flora of both the benthic and pelagic realms should be determined.

(l) Radionuclides should be measured in coastal waters, specifically those of known input sources.

(m) Radionuclides in sediments should be analyzed to determine rate of sediment deposition and whether surface sediments have been disturbed.

(n) Parent-daughter pairs of radionuclides in particulate matter should be examined for disequilibrium values to determine particulate flux and pathways.

(o) A single sampling effort for trace elements and radionuclides will be sufficient for sediment and pore water analysis.

(p) Measurement of stable isotope ratios, carbon and nitrogen should be performed for particulate organic matter in both the water column and sediments.

(q) The isotopic composition of the local offshore oil sources should be measured.

(r) Sediment samples should be collected twice, and in locations that will allow isotopic variations between major topographic features to be defined.

(s) Hydrographic parameters which need to be studied in the water column are temperature, salinity, oxygen, nitrates, nitrites, phosphates, silicates, ammonium, alkalinity, total carbon dioxide and excess Rn_{222} .

(t) The hydrographic parameters which need to be studied in interstitial waters are nutrients (NO_3 , NO_2 , NH_4 , PO_4 , SiO_2 , alkalinity, total carbon dioxide, sulfate, sulfide and gas analyses).

(u) The hydrographic parameters should be sampled and analyzed from a sampling grid of 100 stations which should cover all offshore bases and regions surrounding them. The water column should be surveyed bi-monthly but the interstitial waters need only be sampled once.

(v) Identification of operation-specific substances and their potentially deleterious, physical, and chemical characteristics should be made. Those of greatest concern should be incorporated into the base line in the monitoring program.

5. Physical Oceanography

A first recommendation proposed by the Southern California Academy of Science was a synthesis of all historic data including oceanographic and surface meteorology: (a) The historic data would improve the knowledge of average trans-

ports and seasonal variations; (b) analysis of T-S structure will reveal more information on subsurface and bottom flows; (c) review of areas where insufficient data exists to determine dispersion and transport of water masses; (d) review of the kinds of data CALCOFFI; CFG; AHF; and other pertinent data; and (e) develop background information on eddies and eddy structure. Once the historic data has been centralized and analyzed, the following recommendations should be followed in order to provide a sufficient basis upon which physical oceanographers can provide predictive information regarding the ecological effects of offshore drilling on marine life.

First, scientists should analyze and determine the eddy patterns and structures in the Southern California bight. Eddies may play a key role in determining the location of platforms, i.e., in the center of an eddy or on the edge would make a major difference in the dispersal rate of any enrichment material added to the water. Therefore, some specific studies related to eddy structures should be conducted. The CALCOFFI sampling grid is too large to adequately define small-scale eddies. Additional stations should be added to the CALCOFFI sampling grid in areas of particular interest and in the proposed lease sites as well. A specific study should be conducted on the scale, life history, and depth structure of an eddy.

A base line program should include detailed studies of a few eddies to determine structure and life history. The eddies can be identified and located by aerial surveys. Thereafter, the studies will continue by shipboard operations. The shipboard would include drogues, drift cards, detailed T-S observations to describe the eddies and AxB T's to study structure.

Extensive current studies should be conducted in order to fill in existing information gaps. The total current structure should be determined in a particular study area. Knowledge of the current structure will be used to determine the total residence time of water in the offshore basins. In addition, bottom currents in the study area should be studied and analyzed. In conjunction with current studies reliable and consistent offshore wind data should be reported. It is strongly recommended that the San Nicolas weather station should be continued in order to contribute valuable data. Efforts should be made to continue to follow and monitor existing programs and augment where necessary.

Scientists strongly urged that existing platforms in the Santa Barbara Channel be instrumented with current observations and surface meteorological equipment. It is also recommended that future platforms be instrumented with similar equipment as they are built and installed.

Attempts should be made to encourage merchant marine shipping to send meteorological data near shore. The study should also include the establishment of sealevel tide stations at offshore islands to monitor gross flow between the islands

and the mainland.

The study should also consider the aspects of water exchange in deep basins and exchange between basins as it relates to dispersion of pollutants.

Scientists strongly recommend that a study be conducted of natural oil seeps in order to develop a model for the dispersion and flocculation processes involved in oil spills originating at the bottom.

We urge that the necessary studies be conducted so that prior to any leasing we know the real environmental and economic consequences of the proposal.

L. The Onshore Land Use Impacts of O.C.S. Development

1. Onshore Land Impacts

To a great extent, the influx of onshore activities resulting from O.C.S. development is dependent on the size of the proposed action and the prior presence and extent of off-shore oil and gas development. The National Ocean Policy Study¹⁵¹ indicated that:

Actual impact of O.C.S. development on the economic structures of the coastal zone will depend on a number of variables, such as:

1. Location of oil and gas fields.
2. Location of leased tracts in relation to shipping lanes, recreation areas, wildlife refuges, and so on.
3. Expected size of the reservoirs, estimated production rates, and type of production.
4. Geological, geophysical, economic and other data to indicate whether oil and gas are likely to be transported ashore by pipeline or tanker.
5. Expected size and location of required storage facilities.
6. Whether rigs and platforms will be constructed locally, or imported from traditional supplier states.
7. Existing infrastructure and industrial capacity.
8. Whether only necessary or also optional production facilities include petrochemical plants.¹⁵²

While the primary land use impacts will differ from site to site, depending on the above criteria, most of the related onshore

151

The National Ocean Study Policy was established pursuant to Senate Resolution 222.

152

Senate Committee on Commerce, Outer Continental Shelf Oil & Gas Development and the Coastal Zone, 93 Congress, 2d. Session, Committee Print (1974), at 43. Hereinafter cited as NOPS O.C.S. Study.

activities will require exclusive use of land in coastal areas where intense competition for use of land occurs.

The proposed action would necessitate development in geographic areas of the United States "that have experienced¹⁵³ little or no history of offshore oil and gas operation," as well as in areas which have existing social infrastructures and industrial support capability. Onshore activities related to O.C.S. development having primary land use impacts would include, but are not limited to:

- navigation and access channels;

- crew boat basins, equipment storage depots, and warehousing areas;

- clean-up and containment equipment staging areas;

- pipeline terminals and corridors;

- tank farms, trans-shipment and road or transportation accommodation facilities;

- refineries, petrochemical complexes, and supporting construction industries.

Water and air pollution associated with these onshore activities will occur, though possibly ameliorated by the use of various control technologies.¹⁵⁴ Impacts on aesthetic and scenic values may be adverse and displeasing as a consequence of construction of onshore terminals, product storage facilities, and pumping stations, if these facilities are located in areas valued for

153

Bureau of Land Management, Draft Environment Statement of Proposed Increase in Acreage to be Offered of Oil and Gas Leasing on the Outer Continental Shelf, DES 74-90, Vol. I (October 18, 1974), at 7. Hereinafter cited as Draft E.I.S.

154

Council on Environmental Quality, O.C.S. Oil and Gas - an Environmental Assessment, at 7-78. Hereinafter cited as CEQ Study.

their natural or scenic qualities. Noise pollution from vehicular traffic to and from these facilities may also result, reducing aesthetic enjoyment of scenic and natural areas. The severity of these impacts on the land is also keyed to the pace of development; generally speaking, the faster the development, the shorter the available time for planning for related impacts.

None of the preceding description contends with major onshore land use impacts associated with the potential catastrophe of an oil spill, which, in light of recent freighter accidents near Hong Kong and off the Scottish coast, provides cause for concern and evaluation. Such an occurrence --whether accidental or chronic -- could also have its onshore land impacts. If a spill reached the shore, the primary shoreland impact would be, dependent on severity, the potential for preventing citizen use of the beaches. A spill could destroy existing estuary populations. The secondary impacts include a loss in coastal tourist trade in commercially productive tourist centers with accompanying effects of diminution in land value and the aesthetic enjoyment of the coast. This is very significant in light of the fact that the tourist industry is the third largest industry in California.

Although the possible primary onshore impacts appear substantial, some of the most significant environmental impacts are secondary impacts. These include land use impacts on the affected community infrastructures comprised of physical and

service systems, and business and governmental institutions. Particularly with rapid population increases related to O.C.S. development, induced impacts could be suffered by the water supply and sewage system, the energy supply, residential, recreational, commercial and industrial facilities, and various transportation sectors.

Support services for O.C.S. development are also bound to have a contributive impact. For each community affected, for example, there will be needs for additional schools, law enforcement and fire protection, health care and hospital facilities, sewage handling, solid waste management, and government planning and organization.

2. Evaluation of Adequacy of Draft E.I.S.

The Draft E.I.S. devotes 776 pages¹⁵⁶ to the section entitled, "Description of the Environment"; essentially an extended geographic gazette. The Draft E.I.S. provides an inadequate treatment of the land use impacts of O.C.S. development:

- (a) Its contents do not actually define or describe the amount of land that petroleum operations may require for each region.

155

Id. at 7-13.

156

Draft E.I.S., supra n. 153, at Vol. I pp. 173-792; and Vol. II pp. 1-157.

- (b) The quality or types of land and soil that are suitable for onshore activities are not set forth.
- (c) Significantly, the Draft E.I.S. fails to provide a working discussion of the capability of the shorelands to sustain the many particular onshore primary and secondary activities mentioned above.
- (d) The Draft E.I.S. fails even to mention a method to evaluate the capacity of the described land to carry and endure the additional anticipated burdens created by new onshore activity. To say an area is already industrialized says nothing about its ability or inability to sustain more growth in a rapid fashion.
- (e) Pages 46-54 of Volume II presents cargo transportation figures by volume for the nation's ports. Yet no inventory of supporting industrial facilities is provided in the Draft E.I.S.
- (f) Also lacking is any data attempting to inventory or estimate the acreage available to support and sustain offshore drilling activities in each harbor. The Draft E.I.S. should at least suggest minimum thresholds for adequate service.

The section entitled "Proposed Land Use Policy and Planning Assistance"¹⁵⁷ uses only pipeline corridor studies in illustrating land consuming uses resulting from this expected lease program. None of the many other land consuming uses¹⁵⁸ are mentioned. Under "Potential Special Field Studies",¹⁵⁸ the only onshore activity targeted is again, "Pipeline corridor studies involving suitable O.C.S. and onland area in affected states." This Section Title misleads a reviewer to expect a more exhaustive discussion.

In Volume II, the discussion under "Pacific Coast Region, Resources of the Coastal Zone"¹⁵⁹, notes that the "Channel Islands represent a great potential ecologic and recreation resource." A consideration missed by this discussion is the potential for these islands to serve as bases for storage and staging of emergency spill containment and/or clean-up equipment in support of O.C.S. development. The distance from current harbor complexes -- Los Angeles/Long Beach and Carpinteria/Oxnard - creates pressure to locate such support facilities on the Channel Islands which are closer to the prospective Santa Rosa Ridge and Cortez-Tanner

¹⁵⁷ Id. at Vol. I. p. 124.

¹⁵⁸ Id. at Vol. I p. 136.

¹⁵⁹ Id. at Vol. II p. 31.

Banks lease areas. Again the Draft E.I.S. fails to evaluate the impact of such facilities on these isolated eco-systems or provide any estimate of loss of land for recreation.

The Draft E.I.S. on page 235 of Volume II continues the discussion of onshore impacts in Southern California by indicating that constraints on increased land utilization are solely a problem of refinery expansion. No recognition of other secondary use conflicts is presented.

When enumerating "Conflict with Other Uses of the Land" (Unavoidable Adverse Environmental Effects),¹⁶⁰ the E.I.S. mentions only the single season inconvenience to agricultural land during the period of pipeline construction and burial. Other consumptive land use impacts -- beyond mere pipeline installation inconvenience -- should have been throroughly discussed.

Finally, under the subsection "Land Resources" that would be an "Irreversible and Irretrievable Commitment of Resources",¹⁶¹ the only identified acreage consumed as a result of the proposed action is for pumping facilities, pipelines, and pipeline terminals. No discussion or estimation of onshore land uses could possibly be considered exhaustive with such limited scope.

160

Id. at Vol. II p. 316.

161

Id. at Vol. II pp. 321-322.

These inadequacies suggest that an effort to achieve
162 brevity has resulted in an over-simplification. By constantly limiting illustrations to only the most visible primary impacts, the E.I.S. voids, and thus removes from necessary consideration, many of the land use consumptions that will befall the lands adjacent to the proposed O.C.S. activities.

3. Consideration of Impact on Local Government of
Proposed Action and the Potential for Dislocation

As visible as primary land activities associated with O.C.S. development are, it is in the realm of the secondary land consumption that all non-federal units of government will be impacted and will be required to respond. Yet the E.I.S. only once discusses the full spectrum of these impacts on local government units -- and even then chooses to devote but two sentences:

The resultant demand for services -- for example schools, hospitals, transportation facilities, residential housing, office space, and electric and water utilities, would require considerable planning and increases in local government expenditures. 163

Remarkably, in these two sentences. B.L.M. recognizes clearly where the responsibility for planning for these impacts will lie -- on the local government. However, the document fails to analyze the response capabilities of the local governments.

162 Id. at Vol. I p. 32.

163 Id. at Vol. II p. 246.

While B.L.M. is not required in this instance to discuss the response capabilities of every town and county government along the adjacent coastlines of the proposed program, it could have presented the means and methods by which local land impacts can genuinely be assessed and evaluated. There should be examples and/or models by which local units can:

- (a) Assess and predict probable land needs, both primary and secondary.
- (b) Establish priorities.
- (c) Anticipate rates of land consuming service (roads, schools, water systems) demand growth.
- (d) Evaluate flux of needs in number (3) over time.
- (e) Avoid knee-jerk, crisis-driven land use planning.

The E.I.S. comes closest to answering the above needs in its "Environmental Impacts of the Proposed Action" in which it discusses the estimated primary and secondary employment impacts of O.C.S. activity based on an April, 1974 C.E.Q. Study.¹⁶⁴ Quoting directly from that study, the E.I.S. projects increased primary and secondary employment impact associated with development of the Atlantic O.C.S. at 144,000 and 318,000 jobs, respectively, for the Atlantic region. By contrast, Gulf South Research Institute¹⁶⁵ projects levels of

164

Id. at Vol. II pp. 219-250.

165

NOPS O.C.S. Study, supra n. 152.

20,900 and 65,690 for primary and secondary employment increases for the same Atlantic region. In addition, an extrapolation from a Rand Corporation Study¹⁶⁶ produces an estimate of 18,620 new primary production employees. A fourth study¹⁶⁷ done by Sherman Clark Associates, further supports these latter two studies. However, the National Ocean Study Policy warns that the divergence between the C.E.Q. study estimates and the others may result from the use of different data sets and possibly unwarranted extrapolations:

Whatever the reason for the vast discrepancies between C.E.Q. figures and those of the other studies may be, it is clear that data on the employment impact of offshore oil and gas development in the coastal zone are insufficient to serve as guidance for policymakers. The difference in projected population increases is so vast as to have a serious impact on planning for schools, hospitals, roads, etc.¹⁶⁸

The above discussion should not be easily brushed aside. The two paragraphs below clearly demonstrate the critical nature of the needs that flow directly from knowledge of externally induced population increases.

Offshore oil and gas developments are part of the larger problem of competing uses of the Coastal Zone, problems which can only be solved through comprehensive planning. Oil and gas development in the O.C.S will put additional demands on the use of land for tank-frames, separation facilities, and so on. During the construction stage in

166

167 Id.

Id. at 12.

168 Id. at 12.

particular, new demands will be made on the infrastructure of the coastal zone adjacent to the offshore fields, and the growing population associated with the various stages of development will need housing, schools, hospitals, recreational facilities, etc. A review of the literature on employment associated with offshore petroleum development shows great variation and discrepancy in assumptions about the extent of employment effects, and advanced planning for offshore development in new frontier areas has become very difficult. As planning for additional commercial, recreation, and service-oriented facilities is dependent on accurate employment figures, additional studies of the economic impact of offshore petroleum development must be undertaken.

If the discrepancy in employment data is too large, as is the case in some of the studies made on employment impact associated with development of the Atlantic O.C.S., it will be impossible for state planning agencies to assess accurately additional demands on the infrastructures and front-end capital required to provide additional social services for a growing population. 169

While it is beyond the scope of this review to estimate cash flow problems that might be encountered by government in regions adjacent to O.C.S. Operations, the following cash cost for infrastructure services does mean that some portion of these costs are spent on physical structures consuming land in coastal regions. For example, under tax and revenue structures, the State of Louisiana claims that it sustains net, onshore costs in excess of assignable tax revenues, of \$38 million per year in support of offshore operations beyond the 3-mile limit in order to provide services to people who work in federal waters. 170

169

Id. at 9.

170

Id. at 69.

Texas also has recently released a study¹⁷¹ which estimates the potential costs to the State as a result of new O.C.S. leases in the Gulf of Mexico. It concluded that the net cost to State and local government, in excess of new revenue, will be \$62.1 million per year. Much of this cost¹⁷² will be tied up in providing land consuming facilities.

171

State of Texas' Office of Information Services, Benefits and Costs to State and Local Governments in Texas Resulting from Offshore Petroleum Leases on Federal Lands, Report # 0025-029-1174-NR (Nov. 14, 1974).

172

Id.

M. The Lesson of Santa Barbara

The 1969 Santa Barbara oil spill stands out conspicuously in the minds of all coastal communities as the paradigm example of the potential hazards associated with offshore drilling. No discussion of the environmental and economic impact of O.C.S. development can be considered complete without a review of the Santa Barbara disaster. Nonetheless, the Draft E.I.S. is notable for the absence of any analysis of the Santa Barbara spill. In this section, we shall analyze that spill - its causes, its consequences, and, most of all, its lessons for future offshore development.

1. The Anatomy of an Oil Spill

On January 29, 1969, a blowout occurred at the Platform A offshore rig near Santa Barbara operated by Union Oil Company. Thousands of gallons of oil from well A-21 began spewing into the Santa Barbara Channel, as men worked feverishly to regain well control. The well continued to blow out of control for ten days, until the well bore was choked with cement on February 7, 1969, and well control was apparently regained.

Unfortunately, the spillage began again a few days later. Well A-21 had been drilled to a depth of 3,479 feet but the well bore was uncased below 239 feet. Oil began coming up the uncased bore and then escaping into

shallow oil sands and reaching the surface through pores and fissures. All attempts to control this leakage have failed, as oil continues to flow from under Platform A to this very day. To make matters worse, in December, 1969, human error resulted in a ruptured underwater pipeline between Platform A and the shore, discharging more oil into Santa Barbara waters.

By May, 1969, over 3,250,000 gallons of oil spilled into the ocean according to accepted estimates. Allen, Estimates of Surface Pollution Resulting From Submarine Oil Seepage of Platform A and Coal Oil Point, 1969. An oil slick of over a thousand square miles developed off the Santa Barbara coast extending from northwest of Santa Barbara to Ventura and Oxnard on the south and east beyond the pristine Channel Islands, completely engulfing Anacapa Island. Oil came ashore in heavy dosages to pollute beaches from Santa Barbara to Ventura and on the Channel Islands. Santa Barbara harbor was inundated. Some 390,000 gallons of oil came ashore along a 7-mile stretch of coast at Santa Barbara, while over 1.3 million gallons contaminated 55 miles of mainland coast and 25 miles of Channel Islands coast. Easton, Black Tide, 1972.

There were serious delays in initiating and coordinating contingency plans for oil containment in the first hours and days following the blowout. As it was, containment

and recovery efforts proved woefully inadequate. Over 89,000 gallons of chemical dispersants were discharged into Santa Barbara Channel to no avail, although the chemicals did have deleterious effects on marine life. Easton, Black Tide, 1972. Oil containment booms and skimming devices were useless in open seas, but did prove effective in preventing pollution of several harbor facilities, with the notable exception of Santa Barbara. Straw was helpful in cleanup efforts, although beach sand removal was also necessary. Steamcleaning was the only way to remove oil from stained rocks, but mussels and other rocky intertidal organisms were destroyed in the process.

The cause of the disaster? Officially, the cause of the blowout was the pulling of a "balled drilling bit" which had plugged the well bore and created a loss of mud pressure. U.S.G.S. Report on Lease OCS-P 0241, 1969. Contributing factors were the use of mud weight too light to control formation pressures, the use of mud of improper viscosity, and inadequate mud control indicators, all of which caused a loss of sealing potential. The U.S.G.S. Report also claimed that mud circulation was lost for the 48-hour period prior to the blowout, an indication of pending trouble. Controversy also developed over the depth of well casing. The Department of the Interior

had waived its regulations regarding installation of well casing to a depth of 880 feet because of inadequate geologic structures to which the casing could be attached. They permitted Union to cease cementing well casing at a depth of 239 feet. Regardless of whether lack of adequate casing was a cause of the initial blowout, it appeared to be an instrumental factor in the leakage, which has continued to occur even after the well bore was cemented shut.

Upon whom, then, should responsibility for the blowout be placed? Direct responsibility must be borne by Union Oil Company for a series of errors: improper training in blowout prevention control, poor inspection and safety procedures, use of wrong mud weights and mud viscosity, lack of adequate casing, lax attitude on the part of management toward safety and just plain human error. Ultimately, however, the federal government must bear responsibility for the spill in view of its inadequate understanding of the dangers of drilling in geologically unstable areas, inadequate regulations and safety standards, insufficient inspection procedures, lack of access to critical information necessary to make an independent review of drilling operations, and its general inability to effectively monitor offshore oil activities.

2. Damage to Marine and Coastal Environment

It is virtually impossible to assess the total

long-term damage to the marine and coastal environment resulting from the 1969 oil spill. One scientist, noting that the number of marine organisms appeared to be roughly comparable to pre-spill populations, has concluded that the spill's effect on marine life was negligible. Straughan, Biological and Oceanographical Survey of Santa Barbara Channel Oil Spill, 1969-70, 1971. Others dispute that claim, arguing that no adequate baseline information was available to make such comparisons and charging that the study included no physical or chemical analyses of subtle toxic effects. Blumer, Scientific Aspects of the Oil Spill Problem, 1971; Connell, A Review of Straughan, 1972.

Whatever the long-term damage to the marine ecosystem, the short-term effects were undeniably severe. Dr. Max Blumer of Woods Hole has summarized the potential effects of crude oil pollution:

- (a) Direct kill of organisms through coating and asphyxiation.
- (b) Direct kill through contact poisoning of organisms.
- (c) Direct kill through exposure to the water soluble toxic components of oil at some distance in space and time from the accident.
- (d) Destruction of the generally more sensitive juvenile forms of organisms.
- (e) Destruction of the food sources of higher species.

- (f) Incorporation of sublethal amounts of oil and oil products into organisms resulting in reduced resistance to infection and other stresses (the principal cause of death in birds surviving the immediate exposure to oil).
- (g) Incorporation of carcinogenic or potentially mutagenic chemicals into marine organisms.
- (h) Low level effects that may interrupt any of the numerous events necessary for the propagation of the marine species and for the survival of those species which stand higher in the marine food web.

Many of these effects on the marine environment manifested themselves following the Santa Barbara oil spill. The following table represents a recent estimate of the number of organisms killed or amount of biomass removed as a result of the oil population and oil cleanup activities: Foster, The Santa Barbara Oil Spill: A Review of Damage to Marine Organisms, 1974.

<u>Habitat and Organisms</u>	<u>Damage</u>
Rocky Intertidal Zone	
Barnacles	8,770,000 killed
Surf grass	16 tons of blades & attached algae & invertebrates removed

<u>Habitat and Organisms</u>	<u>Damage</u>
Polychaete worms	80,900 killed
Limpets	51,800 killed
High Intertidal crevice fauna (mostly arthropods)	20,000 killed
Mussels	30,000 killed
Sandy Beaches	
Sandy beach macrofauna	15,000,000 removed during beach cleanup
Deep Subtidal Zone	
Benthic invertebrates	6,000 tons lost
Neritic Habitat	
Marine birds	9,000 killed (60% loons and grebes)

Organisms in the rocky intertidal zones suffered severely. The smothering effect of the oil killed barnacles, surf grass, organisms living in the habitat provided by surf grass such as limpets and polychaete worms, and many other species which commonly inhabit the cracks and crevices of the intertidal and splash zones such as periwinkles, pill bugs, flatworms, sand hoppers, limpets, beetles, etc. Sandblasting and steamcleaning to remove oil stains from rocks appear to have killed many intertidal organisms. A team of researchers has estimated that 60% of the mussels in Santa Barbara harbor were killed as a result of steamcleaning. Jones, et al, Just How Serious Was the Santa Barbara Oil Spill?, 1969.

Long term damage to rocky intertidal organisms also occurs as a result of loss of habitat due to the build up of dried oil on rocks. Sessile organisms do not adhere to or grow as well on dried oil. Over 11 million square feet of rock on public land are still contaminated with oil from the Santa Barbara oil spill. U.R.S., Physical Assessment and Cleanup-Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to the 1969 Santa Barbara Oil Spill Incident, 1974. Continued leakage at Platform A causes further immediate damage to organisms as it reaches shore and also contributes to additional contamination of the rocks. Possible long term effects include reduction in breeding success due to sublethal oil contamination, indirect reduction in predatory species resulting from loss of prey, and the uptake of hydrocarbons by higher order species from intertidal organisms. These consequences have not been investigated.

Sandy beach microfauna, which includes sand hoppers, sand crabs and blood worms, were killed primarily as a result of sand removal during beach cleanup operations. Shallow subtidal organisms, which include giant kelp, other plants, and invertebrates, do not appear to have suffered seriously. Damage to benthic marine life was substantial, however, because much of the oil from the spill ended up on the bottom.

Marine bird losses provide the most dramatic

example of the environmental consequences of the Santa Barbara oil spill. Oil disrupts the water repellent properties of feathers, causing birds to become waterlogged and sink, and also destroys the thermal insulating properties of feathers, causing loss of body heat. Birds also die from oil ingested during preening or feeding. Diving birds like the loon and grebe were thus particularly affected. Attempts to save birds by cleaning their feathers proved futile. Possible long term effects include reduction in breeding success and the uptake of hydrocarbons.

As noted before, long-term effects of the spill are difficult to estimate. Nonetheless, Foster, supra, concludes, "The continued presence of oil from the initial spill on solid substrata and in sandy beaches, the observed changes in deep subtidal benthic communities, and the fact that the oil continues to escape from the platform all suggest that the Channel has not recovered."

3. Economic Impact of the Spill

Estimating the cost of the damage resulting from the Santa Barbara oil spill is a very difficult undertaking. Losses to property and the cost of clean up operations have a readily determined market value. Yet what price is to be placed upon the life of a bird or a sea lion, or upon the loss of aesthetic and recreational pleasures? Despite such difficulties, efforts have been made to quantify in economic

terms the losses occurring as a result of the Santa Barbara oil spill. These are summarized below.

(a) Resources Lost

The amount of oil spillage from Platform A is estimated to be approximately 80,000 barrels. At the 1969 world market oil price of \$2.15 per barrel, the value of the lost oil to Union Oil Company was \$130,000. Mead and Sorensen, The Economic Cost of the Santa Barbara Oil Spill, 1970. At today's prices, the value lost would be several times that amount.

(b) Well Control and Beach Cleanup Operations

The cost incurred by Union Oil Company (and its three partners - Gulf, Mobil and Texaco) for beach cleanup, oil collection, and oil well control was \$10,487,000. The direct cost incurred by governmental agencies for cleanup operations, disaster monitoring, beach and offshore inspection trips, etc., was \$639,200. Mead and Sorensen, supra.

Yet the Santa Barbara beaches are still contaminated. Oil stained rocks destroy the habitat of rocky intertidal organisms, while oil deposits buried in beach sand can affect the habitat of sandy beach organisms. U.R.S., supra, estimated that the total cost to clean up and restore contaminated rocks and sand on publicly owned parks, beaches

and tidelands would range from \$11.8 million to \$30 million.

(c) Damage to Biological Life

Sorensen, Economic Evaluation of Environmental Damage Resulting From the Santa Barbara Oil Spill, 1974, has developed two alternative approaches for valuing the short term damage to marine life as a result of the spill. The first approach is to estimate the cost of replacing the dead or damaged marine organisms. Using Foster's estimate of the number of organisms killed and of the unit prices developed in conjunction with biological supply firms, the following economic value was derived:

<u>Organism</u>	<u>Foster Estimate of Number Killed</u>	<u>Value</u>
Buckshot barnacle	8.7 million	\$870,000
Surf grass Alga	16 tons	\$5,000 (reseeding)
Hydroids	5.9 million	\$1,175,860
Limpets	51,800	\$19,425
Polychaete worms	80,900	\$12,800
High intertidal beetle	1,700	No quotation available
Amphipods and Isopods	18,300	\$4,575
Mussels	30,000	\$9,000
Red worm	10.7 million	\$2,140,000
Sand crab	2.1 million	\$63,000
Beach hoppers (killed in beach cleanup)	780,000	\$23,400

<u>Organism</u>	<u>Foster Estimate of Number Killed</u>	<u>Value</u>
Deep Subtidal Organisms (Mollusks, worms, brittle stars)	24 million	\$6,000,000
California sea lions	10	\$750
TOTAL DAMAGES		\$10,323,910

The information costs of determining long-run damages must also be added to the short-run costs assigned above for replacement, bringing total replacement costs to \$11,323,910.

Sorensen's alternative approach to damage assessment is to measure the short-term reduction in resource yields. In this approach, the contribution of the resource to the food chain, ultimately represented in fish catch, is measured and added to the yield in terms of amenity values of the intertidal and other organisms which were destroyed. Added to this is the information cost of determining long-run damage. Using a resource yield theory of short-run damages, Sorensen estimates the economic cost of the spill to be \$6,831,624.

(d) Physical Damage to Beach Environment

Following the 1969 oil spill in the Santa Barbara Channel, sand was removed from contaminated beaches during cleanup operations. Any cleanup operations which occur in the future to remove remaining contamination will also result in a loss of sand.

U.R.S. has estimated the value of sand on public land lost by 1969 cleanup operations to be in a range from \$185,960 to \$346,370. The value of sand lost by future cleanup of remaining contamination on public land ranges from \$20,477 to \$283,060. The value of sand on private land lost by 1969 cleanup operations or by future cleanup activities was not computed, but would surely swell the above figures. The large variation derives from the fact that beach sand is regarded by some as specialty sand.

Another physical resource of the beach damaged by the 1969 oil spill is driftwood. Considerable quantities of contaminated driftwood were burned or hauled away. Driftwood has commercial value as firewood and as decorative art. U.R.S. estimates the total value of lost firewood to range from \$1.2 to \$1.8 million, and of lost decorative driftwood to be \$20 to \$26 million, respectively.

(e) Indirect Costs

Indirect costs to local governments and to the State of California occurred in a variety of ways. Beaches owned by state and local governments diminished in property value and yielded interim rent and utility losses. These losses have been appraised at \$3.9 to \$5.1 million for the State of California, \$2.6 to 3.2 million for the City of Santa Barbara, \$234,000 to \$326,000 for the County of Santa Barbara, and \$215,000 to \$280,000 for the City of Carpinteria. These losses, which range from \$6.9 to \$8.9 million do not

include the cost of cleanup operations, nor do they include losses suffered by local governments in Ventura County or by private landowners. (Affidavit of George Hamilton Jones in State of California v. Union Oil Company, United States District Court, Central District of California, No. # 69-1068-RM.).

The State of California and local governments also suffered lost sales tax revenues because of lost beach use and lost tourism. The spill cost the State of California \$17 million in sales taxes, the County of Santa Barbara \$1.1 million in sales taxes and \$500,000 in property taxes, the City of Santa Barbara \$3 million in sales taxes and \$600,000 in bed taxes, and the City of Carpinteria over \$566,000 in tax revenues. These losses do not include losses by local governments in Ventura County. (Testimony of A. Barry Capello, City Attorney of Santa Barbara, before California State Lands Commission, November 1974).

Another environmental and socioeconomic impact of the spill was the diminution of public services to local communities. Reduced public services occurred as a result of redeploying existing resources to handle the spill and of lost tax revenues. No value has been estimated for the loss of public services.

(f) Commercial Losses

The commercial fishing industry suffered the most immediate damage from the oil spill. Fishermen were unable

to get boats out of Santa Barbara harbor because of oil containment booms. There was little fishing to be done anyway because of fear of oil damage to vessels and equipment and contaminated catches. Sorensen, supra, calculated damage to commercial fishermen to be \$804,250.

No damages to tourism have ever been estimated because losses to local businesses were cancelled out by gains in other geographical areas. The loss in bed tax revenues by the City of Santa Barbara and the City of Carpinteria, however, indicates that the losses were substantial.

(g) Private Losses

Sorensen supra, estimates that the recreational value of beach experiences lost to residents and visitors was \$3,150,000. Beachfront real estate was damaged by the spill and property values declined. Sorensen, supra, estimated the loss in property value to be \$1,197,000.

4. The Lessons of Santa Barbara

What, then, are the lessons of the 1969 Santa Barbara oil spill?

(a) Oil Spills are Inevitable

Stricter regulations, improved blowout prevention training, technological advances, and more frequent inspections have reduced the probability of a Platform A type of blowout. Yet oil industry engineering experts regard human error as the primary cause of blowouts. No one can guarantee against a repetition of a Platform A blowout.

While the probability of a major blowout has been reduced since 1969, the probability of a major oil spill occurring as a result of increased tanker traffic has steadily increased. This is especially true of Santa Barbara Channel, which is already the busiest shipping lane on the Pacific coast. Increased oil tanker traffic from Alaska coupled with increased traffic from resumption of offshore oil drilling substantially increase the probability of an oil tanker colliding with another vessel or, worse yet, with another tanker or with an offshore platform. The Draft E.I.S. admits the likelihood of a major oil spill.

Many massive oil spills have in the past received worldwide attention. Major spills include the "Othello" tankship collision (3-20-1970; 420,000 - 700,000 barrels); the Tarut Bay pipeline rupture in Saudi Arabia (4-20-1970; 100,000 barrels); the South Timbalier Block 26 OCS-G1870 Shell Oil Company offshore platform explosion in the Gulf of Mexico (12-1-1970 to 4-16-1971;

53,000 barrels);¹⁷³ and the collision of two Standard Oil of California oil tankers at the entrance to San Francisco Bay (1971; 20,800 barrels).¹⁷⁴

On January 17, 1975, the C.B.S. evening news reported on the chronic oil pollution occurring at Bantry Bay on the southwest coast of Ireland.¹⁷⁵ Prior to installation of a Gulf Oil supertanker port, Bantry Bay was an unspoiled natural area rich in scenic and aesthetic values which attracted numerous tourists. Since the installation of the supertanker facility three years ago, however, there have been over a dozen major and minor oil spills. There have been two major spills in the last three months. The beaches, estuaries, and nearshore coastal environment have suffered severe and continuing effects. A spokesman for the Gulf Oil Corporation which owns the supertanker facility admitted in an interview that oil spills, which are the result of human error, are an inevitable consequence of any significant oil production and transportation activity.

Potentially even more dangerous than major oil spills are the cumulative effect of chronic small or moderate spills

¹⁷³ Easton, Robert, "A List of Major Oil Spills", Black Tide, Delacorte Press, New York, 1972 (p.297).

¹⁷⁴ Chan, Gordon L., "A Study of the Effects of the San Francisco Oil Spill on Marine Organisms", Proceedings of Joint Conference on Prevention and Control of Spills, 1972 (pp. 741-759).

¹⁷⁵

C.B.S. Evening News, January 17, 1975.

emanating from tankers, platforms, and broken underwater pipelines. Such spills are an almost daily occurrence. Only a few weeks ago (Los Angeles Times, January 15, 1975), an 18 mile long oil slick appeared in Santa Barbara Channel and was believed to have been discharged by a passing tanker. The draft E.I.S. admits that many small and moderate spills will occur as a result of increased O.C.S. development.

(b) Oil Spills Cause Extensive Environmental
Damage and Economic Loss

Oil spills do serious short-term and long-term damage to the biological life and physical characteristics of the marine and coastal environment. Oil containment and recovery techniques do little to minimize the ecological impact of a spill. The economic costs of a major spill are also extensive, causing losses to many people directly and indirectly. The total cost of the 1969 oil spill, for example, has never been calculated. Indeed, its effects are still being felt.

(c) Liability Mechanisms are Obsolete

The Santa Barbara oil spill demonstrates the total inadequacy of present liability mechanisms to provide compensation for losses suffered by government, industry and private individuals. It was 1974 before suits by local governments and the State of California against the oil companies were finally resolved. Private suits continue. Uncertainty about compensation of losses delays cleanup and restoration. Also, some losses were never compensated, such as the loss of tax revenues by the City of Santa Barbara, the loss of tourism or the loss of marine resources.

Before O.C.S. development proceeds further, provisions should be made to determine liability quickly and to require the oil companies or the federal government to make compensation without unreasonable delay. We recommend that an oil spill liability fund is needed to minimize the economic impact of oil spills. Ideally, the managers of such a fund would include representatives of local government. This recommendation is set forth in greater detail below.

(d) Inability of Interior Department
to Monitor Drilling Activities

One of the primary lessons learned as a result of the Santa Barbara spill is that the U.S. Geological Survey and the Interior Department were not able to monitor offshore drilling activities in an effective manner. While regulations have been strengthened and inspections made more frequent, there are still reasons to doubt the monitoring capability of the Interior Department. The oil companies still control much of the information necessary for effective supervision. Enforcement of penalties for violations of safety regulations is virtually non-existent. A recent report indicates that U.S.G.S. often issued warnings only. Also, proposed orders are regularly circulated among the industry in the Federal Register. In view of the enormous ecological and socioeconomic impact of oil spills on local communities, monitoring and supervision of offshore drilling activities needs substantial improvement.

N. Diminution of Land Value

The draft E.I.S. does not discuss diminution of land values that result from offshore oil and gas development. The combination of negative visual impacts of drilling platform rigs, potential oil spills, increased noise pollution, and deterioration of aesthetically valuable coastal shores all have an adverse effect on surrounding residential and public property.

As a result of the 1969 oil spill, for example, the cities of Santa Barbara and Carpinteria experienced an estimated diminution of land values of approximately \$2,801,000 to \$3,453,000. In addition, the State of California incurred a loss of approximately \$3,850,000 to \$5,155,000 in utility values of state parks and beaches. These substantial losses do not include the millions of dollars which state and local governments expended for cleanup costs and business-related losses.

Oil producers argue that O.C.S. activity will result in new jobs, new businesses to support offshore drilling activities and new tax revenues. Yet recent studies indicate that state and local governments incur excessive cost in providing direct and indirect provisions such as education, health and safety facilities for increased population. A report from the Texas State Senate

176 The Senate of the State of Texas, O.C.S. Production Cost to State and Local Government (November 22, 1974), at 3.

"... cost to state and local government associated with this level of offshore development include the provision of such public services as public education, police protection, highways and streets, and health services to the public directly and indirectly associated with the offshore production."

claims that revenue to Texas from the Gulf of Mexico O.C.S. activity is approximately 48.9 million dollars. The cost incurred by state and local government to provide services is approximately \$111,000,000. Thus, according to the study, the citizens of Texas are paying approximately 62.1 million dollars for services to support O.C.S. drilling.¹⁷⁷

Another ramification, of O.C.S. development is increased onshore activity. Accelerated construction of refineries, pumping stations, etc., must be provided to support offshore activity. Those onshore activities attract additional vehicular transports, thus necessitating more highways and roads. The end result is a diminution of land value, irreparable loss of the aesthetically valuable coastal resources, increased noise and air pollution, and additional and burdensome state and local expenditures. These onshore activities have been described as follows:

. . . generally, however, no provision is made to spare the average taxpayer from the expenses which occur from the destruction of adjacent shoreline areas as a result of severe problems of beach erosion

. . . Cargoes of manufactured goods, petroleum, . . . worth millions of dollars flow through the ports of the local shoreline. Millions of dollars worth of oil are produced from artificial islands, oil platforms, pads and estuaries and on the beaches of the local area. The economic activity along the

177 Id. at 8. See also McCray, William C. and Grabb, Herbert W., Benefits and Cost to State and Local Governments in Texas Resulting from Offshore Petroleum Leases on Federal Lands, Management and Science Division, Office of Information Services, Office of the Governor, Austin, Texas (November 14, 1974).

shoreline is not yet integrated with the life support systems necessary to sustain life on earth; rather, it would appear that the economics of business as currently practiced include environmental deterioration and degradation as a component in the determination of the financial profit of . . . private enterprise. 178

Thus, state and local governments are significantly impacted by O.C.S. development. Yet present leasing provisions of the Department of the Interior do not provide for compensation to state and local governments. Given the potential adverse impacts on state and local governments the present O.C.S. leasing procedure should be amended. In conjunction with the Department of the Interior, oil producers should be required to consult with state and local governments before determinations are made on whether an activity would degrade local environmental and land values. Without such a procedure, the present O.C.S. leasing system deprives state and local governments of a meaningful voice in the determination of their own land uses and may constitute a denial of due process and an unlawful taking of land without adequate compensation. We discuss below the various factors that contribute to the diminution of land values.

Tangible structures in offshore waters diminish the scenic value of coastal waters. Federal agencies (the National Park Service, Bureau of Outdoor Recreation, and the Bureau of Sport Fisheries & Wildlife) have reported that platforms and rigs

178 Fay, Rimmon, Southern California's Deteriorating Marine Environment, Center for California Public Affairs, Claremont (1972), at 3.

visible from the shore, can have a negative visual impact. In the past, it has been difficult to assess the economic impact of offshore oil platform and drilling rigs on land values. As the Western Oil & Gas Association states, "One resident may compare platforms to warts on ocean surfaces while another may find the harbor view more interesting due to night lights on an otherwise dark horizon."¹⁸⁰ A case-history of the Santa Barbara area is useful to illuminate the problem. Platforms are an "unnatural condition"¹⁸¹ in the Santa Barbara environment and their visibility to local residents has been the source of much concern as it relates to diminution of land value. The City of Santa Barbara is located in such a manner that approximately 50% of all potential residential property has some view of the ocean.¹⁸² Though some residential properties are a considerable distance from the water, rigs are still visible, even more so, as the dark structure contrasts with the normally light grey-blue ocean.¹⁸³ On days of

179 Draft E.I.S., supra n. 153, at Vol. I p 23.

180 Wilcox, Susan M. and Walter J. Head, Impact on Offshore Oil Production on Santa Barbara County, California, Wilcox Study, NOAA, Office of C. Grant, Department of Commerce (February, 1973), at 286. Hereinafter cited to as Wilcox Study.

181 Id. at 289.

182 Wilcox Study, supra n. 180 at 290.

183 Id. at 290.

unlimited visibility, some portions of a 100 foot structure, if¹⁸⁴
located 17 miles or less from shore, can be seen from the beach.
The negative visual pollution of oil platforms and rigs has been
one of many factors adversely affecting land values in Santa¹⁸⁵
Barbara.

Land values also diminish as a result of oil spills.
Oil spills contribute to reduction in beach use, both by local
residents and tourists, and cause loss of revenue to state and
local governments. Tourist expenditures are diverted to activities¹⁸⁶
outside of local areas. Oil spills are said to affect tourists
by reducing the physical utility (enjoyment) derived from a beach
visit due to oil deposited initially on the beach and ultimately¹⁸⁷
on the feet, clothing and bodies of tourists. As a result of a
1969 spill, Santa Barbara experienced a substantial loss (\$3,600,000.00)
in revenue.¹⁸⁸ A suit was brought by motel and apartment concerns

184 Draft E.I.S., supra n. 153, at Vol. II p. 214.

185 Narrative statement of George Hamilton Jones, in the case
State of California v. Union Oil Company, et al., filed in the
United States District Court Central District of California,
Civil Action No. 69-1068-RM, at 21. Hereinafter referred to
as the Jones Affidavit.

186 Wilcox Study, supra n. 180, at 284. See also Mead, Walter
J., Phillip E. Sorensen, and Kenneth J. Saulter, The Santa
Barbara Oil Spills; an Economic Appraisal (1973), at 75.

187 Wilcox Study, supra n. 180, at 283.

188 Testimony of A. Barry Capello, City Attorney of Santa Barbara,
before California State Lands Commission, November, 1974.

against oil companies for compensation for losses to these busi-¹⁸⁹
nesses during the spill. The suit was settled for \$1,050,000.
Coastal land owned by private citizens also diminished in fair¹⁹⁰
market value from the spill, and suits are still pending.

Floating material, debris or oil, that is cast up on
the beach or washed into the bay, constitutes an impact on¹⁹¹
aesthetic value for users or owners of local areas. In addi-
tion, construction of onshore facilities needed to support off-
shore drilling activity cause noise pollution as a result of
vehicular traffic to and from these facilities. Noise results
from pumping stations.¹⁹² The E.I.S. acknowledges that "there will
be an adverse impact upon aesthetic scenic values resulting from
construction of onshore terminals, product storage facilities,
and pumping stations if these facilities are located in an area¹⁹³
valued for its natural or scenic quality." The Western Oil &
Gas Association estimates that costs resulting from property
damage as a consequence of unattractive aesthetics is approxi-
mately 100 to 200 million dollars. The Western Oil & Gas
Association admits:

189 Id. at 284.

190 Jones Affidavit, supra n. 185, at 15.

191 Draft E.I.S., supra n. 153, at Vol. II p. 214.

192 Id. at Vol. II. p. 215.

193 Id. at Vol. II. p. 215.

There are some instances where communities situated in or about oil production have deteriorated. Examples include Wilmington, Huntington Beach, and Venice. Although oil production may be one of the contributing factors to this decay, it is not necessarily the only one that many of these localities are affected by other types of heavy industry. It is true that oil production in the community of Venice caused serious problems and is probably responsible for the decline that swept through the Venice Peninsula commencing in 1930. At the same time it must be recognized that operations such as those in Venice are no longer permitted in the City of Los Angeles and are not representative of modern development drilling as conducted by the oil industry.¹⁹⁴

Unfortunately, a recent appraisal indicates that property values are continuing to be adversely affected by O.C.S. activity.

That appraisal, and its background, methodology and findings, are discussed below in considerable detail.

1. Introduction

On January 29, 1979, large quantities of oil and gas began flowing from the ocean beneath or near an offshore drill site situated in Santa Barbara Channel. As a result of this uncontrolled flow, an immense oil slick covered a wide area of the surface of the ocean and was carried to the shores and beaches of the Southern California coastline.

194

Statements made by Seashore Environmental Alliance with Comments by Western Oil & Gas Association, at 7.

George H. Jones, an independent appraiser, was retained to measure the effect of the spill on the fair market of certain public lands belonging to the State of California, the County of Santa Barbara, the City of Santa Barbara, and the City of Carpinteria. Two dates were chosen to make this value comparison: one prior to the oil spill, January 27, 1969, and the other subsequent thereto, September, 1974. An appraisal was also made of the adverse affect on the utility and/or rental value of these public properties.

Four opinions are expressed for each property considered by Jones:

- (a) Fair market value, January 27, 1969: an opinion of the value of the properties prior to the beginning of oil spills on January 28, 1969.
- (b) Fair market value, September, 1974: the fair market value of the properties as of a date subsequent to the oil spill. Jones' appraisal excludes the effect of any physical changes since the earlier date (1969). For purposes of Jones' appraisal, cleanup and other correction of physical damage to the property caused by the oil spill were assumed to have been completed in a proper manner and at no expense to the owner, leaving the property physically equally to its before-spill condition. However, that assumption was made for his appraisal only and was not

intended to imply that such corrective measures had actually been done.

- (c) Diminution of fair market value due to oil spill: the appraiser's opinion expressed as the difference in value between January 29, 1969 and the second date of value (September, 1974). Other losses in value, if any, accruing to the property by reason of changed economic or other conditions were excluded.
- (d) Loss in utility/rental value: an opinion of loss in utility arising from the spill from January 28, 1969 to September, 1974. This estimate may also be considered as a loss of effective rental value.

Fair market value is that price, expressed in terms of cash equivalency, which a property will bring if exposed for sale in the open market allowing a reasonable time in which to find a purchaser who buys with knowledge of all the uses and purposes to which it is adaptable and for which it is capable of being used. Neither seller nor buyer is considered to be under any undue compulsion to sell or buy. While public lands are not normally bought and sold in the open market, in Jones' appraisal such land has been measured by the fair market value of equivalent substitute property.

A definition of utility/rental value is the measure of usefulness or desirability of a property expressed in a monetary sum over a certain period of time. It can be equivalent to a fair

rental value, or, in properties not normally rented such as public lands, equivalent to the effective cost of ownership. Fair rental value is defined as that sum which is reasonably expected for the agreed use of the property. Both owner and tenant are considered to be well informed as to the property's physical condition and as to all uses and purposes to which it is adaptable. Neither are acting under any undue compulsion.

2. Methodology

(a) Diminution of Fair Market Value Due to Oil Spill: Uplands and Tidelands

Jones gave greatest weight to before-and-after-spill property sales. Care was taken to exclude the effect of changes in value arising from factors other than those related to the oil spill.

Aside from sales data involving comparable property, consideration was given to market activity of property along the Santa Barbara-Ventura County coastline which, although not directly comparable, would and did reflect seller and buyer reactions to the oil spill. Additional assistance in this analysis was obtained from a study made of market trends existent on beachfront lands in counties both north and south of subject area.

(b) Loss in Utility/Rental Values

Jones' investigation revealed that coastline properties within the study area experienced a general reduction in the utility

rental value following, and due to the oil spill. The utility-rental loss was shown in the pattern and nature of rental history, cancellation of previous rental reservations, increased vacancy factors, rental adjustment required to retain tenancy, etc..

The experience of affected coastline properties was tested against other similar beachfront properties situated outside the oil spill area. Analysis was also made of the pattern of income generated from use and tenancy of facilities within and adjacent to Santa Barbara harbor during the study period. Data was also obtained from the State Department of Parks and Recreation covering the attendance at local and state beach parks before and after the spill.

Applicable data was converted to a calendar year basis to compare with the term of the utility loss. Loss of utility accruing to property from the oil spill was established through analysis of this data. The appraisal was further expanded by comparison of attendance at state beach parks situated in other counties outside the oil spill influence.

(c) Conversion to Monetary Equivalency

Rental and utility losses suffered by income-producing harbor properties was obtained from an analysis of actual income history. Because parks and tidelands are not generally operated on a lease basis, however, another method of conversion to monetary equivalency had to be developed.

Utility and rental value were converted to monetary equivalency on a cost-of-ownership basis. The state, city or county all had an effective investment in beach properties equal to their fair market value. A major part of the cost of ownership is the interest charge on the investment in, or value of, land and improvements, plus provisions for recapturing the value of improvements over the term of their useful life (amortization).

In some instances, entrance, camping and other fees are charged to visitors and some income is derived from concessions. The operating costs for public lands, however, are far in excess of revenues received. Therefore, the actual cost of ownership results in an additional sum added to that of interest and amortization charges alone. Total annual cost of the facility to the owner must include interest returned, amortization provisions, and the residual operating cost over concession and entrance fee income.

The cost per visitor per year can be developed from the beach park attendance. The utility of a park can be measured, at least in part, by per visitor cost. If a catastrophe occurs, making a park less attractive or of less utility to the public, fewer visitors frequent the facility. Although revenues drop, operating costs would remain approximately the same and interest and amortization charges would remain constant as the owner's investment is not altered. Net cost of ownership per visitor would, therefore, increase. The loss in utility, then, can be measured by the increased cost of serving the public.

Jones utilized the theory of utility or rent loss described above in the analysis of upland properties. Computations for each property vary by reason of differing physical value, operational and attendant characteristics.

(d) Tideland Beach Utility/Rent Loss

The loss in utility-rental value to tideland beaches has been measured in the same manner. The equivalent rental value was adjusted for restricted uses and the nature and quality of beaches and the density of use as reflected in the experience of state beach parks where attendance data is available.

The degree of reduction in attendance at adjacent park areas resulting from the oil spill was then applied to the rent estimate. The term of loss (one to five years plus) is judged also in relation to the experience of the parks in the particular region.

(e) Other Factors Considered

Additional factors considered are summarized below:

(a) loss of anticipated future benefits of ownership such as enjoyment of amenities, utilities, pride of ownership, ability to rent or sell and other benefits; (b) impairment of property uses and other amenities which motivated purchase or lease of beachfront or harbor property; (c) market analysis of sales and rental studies, review of opinions and statements of owners, sellers, buyers,

tenants, brokers, and other informed persons; (d) the character of the typical buyer, tenant or user, as to his/her sensitivity to impairment of amenities and ability to purchase, rent or attend some other segment of the California coastline free of the oil spill influence; (e) change in attitude toward amenities of ocean-front property and stability of property as an investment; (f) depth of market demand as compared with other similar areas outside oil spill influence as well as subject area prior to spill; (g) general uncertainty by owners, tenants, and users as to future oil spills from the same source; (h) effect of continued existence of platforms as a visible reminder of exposure to future oil spillage; (i) the widespread awareness of the oil spill and its effects on the local, regional and national market; (j) investors' attitude toward effect on rental value and rate of return required to offset additional risks of future rent losses; (k) extent and effect of 1969 spill properties in study area; (l) nature of the property interest being valued; (m) general and local economic conditions; (n) population trends and their relation to beach usage inside and outside the areas of oil spill influence; and (o) personal experience in evaluation of beachfront property along the southern and central California coast since 1948.

3. Findings

Below are Jones' preliminary findings regarding diminution in value and loss in rental/utility accruing to various properties being valued. These preliminary opinions are expressed solely

for the purpose of indicating the general scope of the damage estimates.

PRELIMINARY OPINION VALUE DIMINUTION AND RENT/UTILITY LOSS

State Ownership:

<u>Property</u>	<u>Range of Damages</u>
McGrath	\$ 300,000 - \$ 450,000
Buenaventura	1,250,000 - 1,500,000
Emma Wood	250,000 - 350,000
Carpinteria	550,000 - 650,000
El Capitan	60,000 - 125,000
Refugio	40,000 - 65,000
Gaviota	75,000 - 100,000
University of California	150,000 - 200,000
Tidelands	<u>1,175,000 - 1,715,000</u>
Total State:	3,850,000 - \$5,155,000

County of Santa Barbara:

<u>Property</u>	<u>Range of Damages</u>
Rincon	\$ 15,000 - \$ 20,000
Lookout	20,000 - 30,000
Arroyo Burro	50,000 - 75,000
Goleta	100,000 - 130,000
Isla Vista	5,000 - 6,000
County Tidelands	<u>50,000 - 65,000</u>
Total County:	\$ 234,000 - \$ 326,000

PRELIMINARY OPINION VALUE DIMINUTION AND RENT/UTILITY LOSS

(continued)

City of Santa Barbara:

<u>Property</u>	<u>Range of Damages</u>
East Beach-Palm Park	\$1,100,000 - \$ 1,350,000
West Beach	260,000 - 310,000
Leadbetter	625,000 - 675,000
Shoreline	120,000 - 160,000
Cliff	11,000 - 13,000
Harbor Area	220,000 - 300,000
City Tidelands	<u>250,000 - 365,000</u>
Total City:	\$2,586,000 - \$ 3,173,000

City of Carpinteria:

City Beach	\$ 100,000 - \$ 125,000
City Tidelands	<u>115,000 - 155,000</u>
Total City:	\$ 215,000 - \$ 280,000

TOTAL DIMINUTION AND LOSS IN RENTAL/UTILITY
ACCRUING STATE, COUNTY AND LOCAL PROPERTIES

STATE:	\$3,850,000.	to	\$5,155,000.	
COUNTY:	234,000.	to	326,000.	
CITY:	<u>2,801,000</u>	to	<u>3,453,000.</u>	
TOTAL:	<u>\$6,885.000.</u>		<u>\$8,934,000.</u>	195

195 Jones Affidavit, supra n. 185, at 22.

The purpose of presenting a summary of the Santa Barbara experience as to diminution of land values is to dramatize an important issue which has received scant attention in the E.I.S. We suggest that a careful study and analysis of the general impact of O.C.S. development on coastal land values be prepared prior to O.C.S. leasing.

O. Lack of Compensation to Local Government for Losses
Associated with O.C.S. Development

This section attempts to articulate and delineate the issues surrounding the assumption of liability for costs to state and local governments and to the private sector which heretofore have remained largely uncompensated.

The history of industrial development in the United States has been characterized by a laissez-faire attitude which leads to the exploitation of natural resources which are, in fact, nationally owned. Although exploitation has led to detrimental effects upon the surrounding environment, as well as depletion of natural resources, the industrial concern which produces these detrimental effects has not assumed the additional burden of paying for the harm. Growing awareness of the local financial impact of O.C.S development suggests that this attitude should be reconsidered.

The Draft E.I.S. does not contain such an analysis. Discussion of the problem, however, is essential to a fully-reasoned understanding of the issues surrounding O.C.S. development and a fair distribution of its benefits and costs.

The discussion here will focus primarily on the concept of "externalities." Externalities are costs which are produced by economic or other activities which may or may not have been included in the calculation costs that precede, accompany, or follow production. The thrust of much modern judicial, economic

and sociological concern is the more effective industrial or governmental internalization of externalities which heretofore have fallen upon society with no adequate compensation and resulting in a totally inequitable allocation of certain burdens. The discussion of a more equitable assumption of costs for externalities will center on the external costs now borne by state governments, local governments, and private individuals-- a crucial focus for a program designed to analyze the effects of proposed O.C.S. development because revenues now paid by oil producers drilling on federal offshore lands go only to the federal government.

196 A recent report from a Governor's committee in Louisiana discusses equitable sharing of O.C.S. benefits among all levels of affected government. The Report states:

. . . Although corporations engaged in O.C.S. activity must pay bonuses and royalties to the federal government, these benefits are not automatically shared with that state where the demand for state and local governmental facilities and services from local governments is made more severe by the inability to reach all of those responsible for the increased costs.

The Gulf South Report will act as a statistical and practical basis for the following discussion of efficient and equitable internalization of these externalities. The theoretical basis for the following discussion is based on an insightful and illuminating

196 Gulf South Research Institute, Baton Rouge, Louisiana, Offshore Revenue Sharing: An analysis of Offshore Operations on Coastal States, prepared for the Governor's Offshore Operations on Coastal States, GSRI Project No. X5-614 at 1. Hereinafter cited to as Gulf South Report.

law review note entitled A Decision-Making Process for the California Coastal Zone.¹⁹⁷ This article proposes that all affected parties become viable participants in the decision-making process which affects development of both private and public resources. The underlying framework for the argument advocating a totality of participation is described as follows:

. . . the appropriate social arrangement for an optimum allocation of resources should be a result of an examination of and choice between alternative real institutional systems - i.e. institutional systems operating not merely in "theory", but in a society where decisions in both the public and private sectors are reached by bargaining among interested persons, where persons affected by decisions arising out of the bargaining process are often not represented in that process, and where decisions in both the public and private sectors are reached with limited information about the desirability of alternative decisions.¹⁹⁸
(Emphasis added.)

Considering the problem of externalities from both a theoretical and an empirical foundation, we recommend that the Department of the Interior review the current distribution of benefits and burdens, and consider the implementation of an equitable revenue-sharing system between the federal government and other affected bodies, both governmental and private, or,

¹⁹⁷ Southern California Law Review, A Decision-Making Process for the California Coastal Zone, Vol.46, No. 2 (1973), at 513-564. . . Hereinafter cited as A Decision-Making Process.

¹⁹⁸ Id. at 515.

alternatively, institute a judicial or administrative scheme for
the imposition of development charges¹⁹⁹ upon the oil producers
granted the privilege of O.C.S. development.

1. A Theoretical Argument in Favor of Institution
Methods to Effectively Internalize Externalities

Although A Decision-Making Process is specifically
oriented towards an economic and legal analysis of the problems
of effectuating efficient management of the California Coastal
Zone, the analysis applies equally well to any discussion of the
utilization of public resources. O.C.S. development inevitably
will cause many obvious externalities. This eventuality should
be considered now by B.L.M. in order to prevent ongoing and
future litigation and other problems arising from these costs.

As general background the conceptual framework of
A Decision-Making Process should be delineated. The author
articulates the difference between a "comparative" approach
to the issues of externality control and an "absolutist" or
"nirvana" approach. The latter approach leads to a polarity
of positions and is usually not helpful to a successful resolu-
tion of the issues. The former tends to balance the conflicting
positions and attempts some practical compromise. A longer
exposition of this point is contained in Demsetz, Information
and Efficiency: Another Viewpoint, 12 J. Law and Econ. 1, 1
(1969) which states:

199

Id. at 551-564. See generally the final arguments and conclu-
sion of the note where the recommendation is strongly made for the
imposition of development charges in the coastal zone context.

. . . The "nirvana" approach implicitly presents the alternatives to any allocational problem as the present "imperfect" institutional system and some ideal norm. Its advocates seek discrepancies between the real and the ideal. Once discrepancies are found, it is deduced that the real is inefficient and insufficient. On the other hand, a comparative institutional approach uses the ideal only as a standard to measure divergence between alternative real institutional arrangements in a process of selection of the arrangement most able to cope effectively with the problem.

200

We suggest that the B.L.M. take a comparative institutional approach in its analysis of these problems in order to preserve what institutional efficiency and equity already exists and to modify the institutional methods to incorporate more effective means of spreading these costs.

The claim for effective internalization of externalities is grounded in discussions involving the decision-making process itself. It is essential to equitable decision-making that there be effective participation of all interested parties. A Decision-Making Process describes the unfortunate consequences to the general welfare when effective participation has not taken place:

When a decision-maker fails to consider the effects of his decisions upon others, the costs which he calculates as incidental to alternative allocations of resources are not equivalent to the costs that society will incur as a result of his decision. Thus, a divergence between social and private costs (or benefits) will result, and the price mechanism will not serve as a check on his decisions to insure that his interests coincide with those of society. The Pigouvian²⁰¹ tradition asserts that, when such a

200

Id. at 514-515.

201

Id. at 517.

divergence exists, steps should be taken to equalize private and social costs through taxation or subsidization.²⁰²

Because inequitable results can have a dire impact on public attitudes, the economy and the general welfare, emphasis should be placed upon improving the decision-making process. The existence of substantial externalities shall generate the necessity for methods encouraging wider participation and encourage the public sector to seek more effective participation:

. . . the general solution to the problem of externalities is to expand the scale of decision-making so that additional participants have an input into the bargaining process. This will insure that all competing demands for resource use will be considered in allocational decisions, and that an individual acting in his own best interest is acting in society's best interest as well. It appears, therefore, that the existence of externalities creates an incentive (analogous to the concept of market demand) for altering the process through which decisions are made.²⁰³

Although there has been substantial academic discussion and empirical implementation of changes in the decision-making process to accomodate the private sector, such a process is only beginning to emerge for the public sector.

In considering costs produced by economic development, weight should be given to factors involving "fairness" as well as those involving "efficiency". Until the present time most economic

²⁰² Pigou, A., THE ECONOMICS OF WELFARE, 4th Ed. (1932).

²⁰³ A Decision-Making Process, supra n. 197, at 518.

developments have focused almost entirely on efficiency matters. Yet there is a growing interest in the effective incorporation of "fairness" concerns. The importance of the national basis for this shift in emphasis is contained in the following exposition:

. . . a determination of the optimum social arrangement should involve considerations of fairness as well as the efficient allocation of resources. The value (or cost) of a resource is a function of the expectations of future returns from it. Inequity generally arises in the context of resource allocation when pre-existing expectations are upset, thereby causing a transfer of assets from one resource user (or non-user) to another. The usual remedy for such an unexpected and inequitable transfer of assets is a corresponding payment of compensation. Indeed, these considerations, implicit in the just compensation clause of the Fifth Amendment, may be constitutionally compelled. (Emphasis added.) 205

Some assert that "fairness" concerns are unimportant because the price mechanism of the market will take into account any additional costs. That argument, however, is negated by the fact that the pricing mechanism does not always work:

One example of a situation in which externalities are not accounted for in pricing decisions is seen when prior official statements that the public has rights to alter private lands without compensation are not considered in price fully because there has not been enforcement of the "rights" in the past. On the other hand, externalities may put the parties on notice of future restraining action. For example, a purchaser of property in an undeveloped area which is expected to be developed soon will consider in the price paid for the property that certain uses, such as letting his wastes settle upon surrounding land, may be restrained at some future time. 206

204

See generally, Coase, The Problem of Social Cost, 3 J. Law and Econ. 1, (1960).

205

A Decision-Making Process, supra n. 197, at 530.

206

Id. at 531.

Just as this future purchaser of property must be made fully aware of the external costs if he develops his land, so must O.C.S. developers realize their liability for future external costs imposed by their development on nearby governments and individuals. That liability must be included in their calculations of the price paid in a lease system. Their calculations must also include the cost of compensating those harmed as a result of external effects.

The insightful analysis contained in The Decision-making Process concludes with an explication of a system of development charges which effectively internalize many externalities that will be produced by developers of the California Coastal Zone. We suggest that the Department of the Interior or B.L.M. consider such methods of efficiently and equitably spreading the cost of O.C.S. development.

2. An Empirical Analysis of the Benefits and Costs of O.C.S. Development Off the Coast of Louisiana

The Gulf South Report, supra, provides a thorough statistical foundation for issues involving the necessity of revenue-sharing processes between federal, state, and local governments. The report summarizes both the benefits and the costs to Louisiana of O.C.S. development:

The development of petroleum resources from O.C.S. regions produces both economic benefits and costs for adjacent coastal states. One of the major benefits is increased employment and associated incomes for people in the region, while the primary cost of such development stems from the increased

demand for governmental facilities and services. The development of these petroleum resources is of particular concern because the activity is beyond the taxing authority of both state and local governments. 207

The study not only summarizes in statistical and textual fashion the actual impact on Louisiana of O.C.S. development, but also attempts to formulate some of the problems which other states might face as a result of similar O.C.S. development. The document is an invaluable source:

This study evaluates the impact of O.C.S. activity on state and local governments in contiguous coastal states. The situation in Louisiana is examined in detail in order to determine the cost of governmental services associated with the large amount of activity in the O.C.S. region and to indicate what other coastal states might experience as their O.C.S. regions are developed. This is done in the context of an understanding of the physical relationship of the O.C.S. to the coastal areas, the petroleum potential of various O.C.S. regions, and the national energy crisis. 209

The Gulf South Report is a justification on statistical grounds for the assertion that the federal government should be compelled to share the proceeds realized from O.C.S. development. 210

207

Gulf South Report, supra n. 196, at 1.

208 The Gulf South Report is a long and detailed report. The issues it raises can only be discussed above in a summary fashion. However, we commend the full report to the reader for analysis.

209 Id. at 1-2.

210 Id. at 4-5. "Although the companies directly involved in O.C.S. production pay large sums to the federal government in the form of bonuses and royalties, these are not shared with the states providing the services and facilities used. There is presently no equivalent sharing of revenues from federal O.C.S. activities as the 37-1/2 percent shared from mining operations on federal lands within

Moreover, the oil producers, arguably, should be administratively compelled to enter into a revenue-sharing scheme with the affected state and local governments in order to provide compensation for the external costs created by their activities which have not been adequately offset by increased benefits to onshore interests.

The Gulf South Report focuses upon the comparative merits of O.C.S. development affecting Louisiana. A brief statement of both the benefits and the costs incurred by O.C.S. development is in order. The primary benefits conferred by O.C.S. development in Louisiana involve an increase in employment opportunities:

In Louisiana, . . . O.C.S. production directly induces employment in the areas of mining, manufacturing, construction, chemicals production, and refining. These employees, in turn, induce employment in a wide range of service and trade industries. In all, it is estimated that the total employment impact of O.C.S. activities in Louisiana is approximately 124,400 employees. When the families of these workers are included, the population impact is estimated to be approximately 391,000.²¹¹

Such an increase in population and employment can also be a beneficial impact upon state and local governments in the form of increased consumer activity and alleviation of welfare problems.

210 cont'd

state boundaries. In 1972 approximately \$336 million in royalties was paid to the federal government by firms operating beyond the three-mile boundary offshore Louisiana."

211

Id. at 517.

The costs of O.C.S. development, however, appear to outweigh the benefits. Briefly, these costs, fully developed by supporting statistical data in the Gulf South Report, can be summarized as follows:

1. Impact of possible oil spills.
2. Impact of developing channels, laying pipelines, building rigs, and disposing of waste materials.
3. Effects of production activities on marsh land, and on fish and wildlife habitats.
4. Loss of land for competing uses.
5. Detrimental effect on the aesthetic appearance of the coastal regions.
6. Impact on individual port facilities and roads.
7. Impact on a myriad of public services including education and police protection.
8. Absence of opportunity for state and local governments to tax these activities because²¹² they exist on Federal lands.

212

Id. at 541. "In setting up a tax structure to support the expenditures deemed necessary and desirable in a society, government seldom attempts to draw precise one-for-one relationships between taxes paid and benefits received. For example, persons pay property taxes which are used, in turn, to support education. The taxes are not based on how many children are in a household; rather, it is reasoned that there is a social benefit from having education available for all children. Even in cases where there are more directly traceable benefits between taxes and services, as in the case of highway use taxes, the tax is based on such variables as fuel consumption and weight--neither of which may be directly related to the benefit the user sees in being able to use the highway system. So it is with nearly all taxes. The revenues from a whole array of taxes are needed to finance the nation's collective expenditures."

The Gulf South Report concludes:

Regardless of the tax or economic structure, however, someone must subsidize the supplying of service to Outer Continental Shelf users relative to what would be the case if taxing powers were present.²¹³

Special emphasis is placed upon the large sums that are lost to the state because of the inability to tax O.C.S. development despite the costs associated with providing onshore services. The lost revenues derive from the inapplicability of the following taxes: (1) severance, (2) income, (3) corporate franchise, (4) sales and use, (5) occupational license, (6) ad valorem, and (7) miscellaneous which includes primarily power use taxes and a small amount of natural gas franchise²¹⁴ tax. The taxes foregone in all these categories in 1972 are estimated at \$183,488,000.

The estimated cost of governmental services arising as a result of O.C.S. activity is \$265,044,000.²¹⁵ Individuals are paying their appropriate part of these costs but 60 percent of these costs are borne by corporations. Because much corporate activity is taking place on the O.C.S., private corporations are not paying their appropriate share.

²¹³ Gulf South Report, supra n. 196, at 541.

²¹⁴ Id. at 555.

²¹⁵ Id. at 558.

An interesting and somewhat unusual possible future cost of O.C.S. development is expressed as follows:

In addition to the fact that current offshore operations require shoreline governmental services, there is uncertainty over the future economic base of the area. Much of the expansion of public facilities and services has been based on the rapid growth and needs of the offshore oil and gas operations. However, in 1972 over 38 percent of the offshore area adjacent to Louisiana was already under lease. As to what happens to this area when the oil and gas reserves are depleted, one cannot say. This added uncertainty is a cost to state and local government which cannot be quantified at this time. Nevertheless, the cost must be recognized and steps taken to prevent an Appalachia from developing in the coastal zone.²¹⁶

The Gulf South Report takes caution to point out that there may be significant differences in the costs that will be imposed on other coastal areas if the O.C.S. is developed in other areas. The differential is based on the following rationale:

These estimates of costs for governmental services are only rough indications of the potential magnitude of such costs. In reality, many factors enter the situation. The cost of governmental service will vary from region to region and probably can be expected to rise for all regions. The employment relationships currently applicable in the Louisiana situation may not hold for other areas now or in the future. Moreover, the productivity of the petroleum fields themselves can be expected to vary from region to region.

In view of all these factors, it is useful to consider the magnitude of the potential costs and to consider the direction of the potential errors in these estimates. Two factors may suggest that the costs can be even higher than

that estimated. These factors are (1) that the Louisiana offshore fields have been very productive and other regions may experience less productivity; and (2) the costs of governmental services have steadily risen for all regions in the country.²¹⁷

Thus, there is a likelihood of greater costs from O.C.S. development in subsequently-leased areas. For this reason, we suggest that B.L.M. consider such issues now in order to avoid even greater economic imbalance in the future.

3. Substantiation of the Gulf South Report by a Similar Texas Study

At the request of State Senator A.R. Schwartz, a recent study was published on November 20, 1974²¹⁸ entitled Benefits and Costs to State and Local Governments in Texas Resulting from Offshore Petroleum Leases on Federal Lands.

The study made these conclusions:

- (a) Increased annual revenues to State and local government will be \$48.9 million. (There is no direct tax or other direct income to the adjacent state from production on federal offshore lands; thus, these revenues are taxes collected on related expenditures that are made within the state.)
- (b) Cost of additional services that will have to be provided by State and local government are estimated at \$111 million per year.
- (c) Thus, the NET COST to State and local government, in excess of benefits, will be \$62.1 million per year.²¹⁹

²¹⁷

Id. at 569-70.

²¹⁸

Office of Information Services, Governor's Office, Austin.

The body of the report sets out the statistical and diagrammatic analyses supporting the conclusions above. Most of the data tends to support the findings of Gulf South Report.

In Texas, the estimated growth in total employment is 69,034. This will result in a total population growth of 177, 961. A comparison is made between the benefits conferred on the State of Texas by O.C.S. development through this increase in employment and population and the burdens imposed on Texas primarily through the provision of increased public services.²²⁰ The report concludes:

Therefore, given the current tax structure and level of public service expenditures, production of the offshore leases would not result in an improvement in the fiscal condition of state and local governments in Texas. The cost to Texas state and local government associated with production of the federal leases are estimated to exceed the associated benefits by \$62.1 million, annually.²²¹

A critique of this Texas study was issued in an informal manner by Mr. William Ahern of the Rand Corporation²²² in Santa Monica, California. Mr. Ahern criticizes many of the components of the Texas study:

(a) There appears to be a strong bias in favor of

Texas acquiring a much-larger percentage of the

²¹⁸ cont'd: Texas, Benefits and Costs to State and Local Governments in Texas Resulting From Offshore Petroleum Leases on Federal Lands, prepared at the request of State Senator A.R. "Babe" Schwartz (Nov. 14, 1974). Hereinafter cited as The Texas Study.

²¹⁹ Id. at 29.

²²⁰ Id. at 8.

²²¹ Id. at 8.

²²² Letter from William Ahern (Rand Corporation) to Mr. Peter Douglas, Consultant, Assembly Select Committee on Coastal Zone Resources, State Capitol, Sacramento, California, December 9, 1974.

federal funds realized from O.C.S. development rather than participating on an equal basis with other states in a national revenue-sharing scheme through the Land and Water Conservation Fund which distributes federal funds to federal and state park agencies for acquisition of parkland. These funds arise from payments to the Federal government from O.C.S. development.

(b) The Texas taxing procedure appears to place heavier burdens on oil consumers in other states since its major revenue-producing tax, and the reason that Texas does not have a state income tax, is a severance tax on oil produced in the state.

(c) Mr. Ahern believes that The Texas Study has greatly overestimated the increase in employment as a result of O.C.S. development.

(d) Mr. Ahern believes that the statements from The Texas Study involving governmental costs do not include federal contributions which have already been applied to mitigate these costs.

These criticism of the Texas Study notwithstanding, Mr. Ahern states that this question should be addressed in California and "I'd love to do the job right for the State of California." These latter statements support the general tenor of Mr. Ahern's letter which is not that he believes the findings of the Texas study regarding the problems of fair assumption of

external costs and equitable revenue-sharing schemes to be wrong, but rather that some of their methods might be questioned on grounds of statistical accuracy.

Mr. Ahern also expresses his interest in California problems specifically: 1) "In terms of California's benefit, it is not beneficial to have Texas share a greater portion of funds if that means we would have much less parkland in [California]. 2) The taxing discussion is not relevant to California because California has sales, property, and importantly, income taxes which offset public service costs."

The critical point is that neither party denies the fact that the questions involving equitable-sharing are important and deserve thorough investigation.

D. Conclusion

The preceding discussion addresses crucial economic questions: What are the external costs created by O.C.S. development? Are these costs being borne in an economical and equitable manner? How could these costs be more effectively allocated? Who should bear these costs in the future? The Department of the Interior did not address these questions in the draft E.I.S., despite their importance to the economy of coastal states. No compensation is being paid to states, local governments, and private individuals for costs incurred as a result of O.C.S. development even though agreement has been made to assume these costs.

We recommend that the Department of the Interior undertake to study the problem of equitable sharing of costs and to formulate rational institutional approaches to resolve the problem.

IV AN ECONOMIC ANALYSIS OF THE FEDERAL LEASING SYSTEM

The purpose of N.E.P.A. is to assure that environmental values be given appropriate consideration in decisionmaking "along with economic and technical consideration . . ."

42 U.S.C. §102(2) (b) (Emphasis added) For this E.I.S. to be a comprehensive cost-benefit analysis, the E.I.S. must explore the economics of the leasing system. In determining whether the adverse environmental impacts of O.C.S. development are outweighed by the need for the petroleum and the economic value of leasing, there must be a careful analysis of the issue of whether the nation is receiving a fair return for use of national resources belonging to all of the people.

There are serious deficiencies in federal O.C.S. leasing practices. Economic analysis of those practices reveals that the current "bonus royalty" procedure for leasing federal lands on the O.C.S. does not encourage effective bidding competition, does not guarantee a fair return on the value of leased federal lands, and does not encourage the optimum rate of development of oil and gas reservoirs.

These deficiencies indicate the need for an evaluation of alternative leasing procedures. The draft E.I.S., however, does not consider the relative economic merits of other leasing methods. Only the current leasing system is seriously considered. Given the importance of choosing the leasing procedure which will produce the greatest return to the federal government for this valuable property, we recommend that B.L.M. officials make a thorough appraisal of alternative leasing procedures in light of available economic data before undertaking the proposed O.C.S. development.

methods, several factors should be considered. A leasing procedure should be chosen with an eye toward the future value of oil lands as well as to an accurate evaluation of the present high value of this resource. U.S.G.S. should be provided with sufficient guidelines to guarantee an accurate ongoing appraisal of the value of the oil produced throughout the term of the lease. As well as acting as a safeguard for a fair return from the federal offshore lands, U.S.G.S. must be afforded adequate guidelines and standards in order to effectively supervise the exploitation of oil lands by producers. In this regard, primary emphasis must be placed upon supervising the rate as well as the methods of exploitation used by the oil producers.

We recommend that the Department of the Interior and the federal government give serious consideration to the following: (1) alter the current form of leasing, (2) emphasize fair market return to the federal government, (3) share the risk of exploration and development of the resources, and (5) pursue the investigation of other energy sources through contributory funds from offshore oil development.

A. Current Leasing Procedures

1. What is the Leasing System at Present?

Most O.C.S. leases to date have been granted according to the "cash bonus-fixed royalty" system, pursuant to the following statutory language of 43 U.S.C. §1337 (Outer Continental Shelf Lands Act):

223

The primary research document which served as the foundation for the following argument and analysis is a report prepared by the Office of Energy Research and Development Policy, National Science Foundation, prepared in September, 1974, entitled, An Economic Analysis of Alternative Outer Continental Shelf Petroleum Leasing Policies. Hereinafter referred to as the National Science Foundation Report.

The bidding shall be . . . (2) at the discretion of the Secretary, on the basis of a cash bonus with a royalty fixed by the Secretary at not less than 12 1/2 per centum in amount or value of the production saved, removed or sold, or on the basis of royalty, but at not less than the per centum above mentioned, with a cash bonus fixed by the Secretary.

The only exception to this system of bidding (although the statute does provide for the implementation of alternative bidding systems) is the proposed leasing of O.C.S. lands off the Louisiana coastline where an experimentation with the "royalty-fixed cash bonus" system is included in the total leasing scheme:

All O.C.S. lease sales to date have been conducted on a cash bonus, fixed royalty (16 2/3%) basis, although imminent Louisiana #36 includes 10 tracts being offered on a royalty basis as a test of that system. 224

The cash bonus fixed royalty system operates as follows:

The salient features of current leasing policy are: determination of the lessee by "bonus" bidding; establishment of the royalty rate at one-sixth of the wellhead value of petroleum; exploration and tract nomination by private industry; and limited acreage leased annually by the government. 225

This system combines an opportunity for oil producers to offer, on a competitive basis, an initial substantial cash payment, which will be paid to the federal government upon granting of the lease, with a fixed royalty established by the Secretary of the Interior based upon the estimated value of the leased lands.

224

Draft E.I.S., supra n. 131, at Vol.I p 93.

225

National Science Foundation Report, supra n. 223, at 1.

The current economic situation, however, is vastly different from that existing at the time the system originated. The primary economic changes which have occurred in these areas are: (1) a switch from private to public lands as the target of oil exploration; (2) greater costs of drilling; (3) a rise in price of oil; (4) greater market and environmental uncertainties; and (5) a greater reliance on O.C.S. resources.²²⁶

The historical precedent of the development of private lands made it economically desirable to place the risk of development solely upon the oil producers, as small landowners did not possess the resources to assume this risk. That rationale is no longer operable in the context of O.C.S. development because the landowner is the federal government. The government as lessor can easily share the risk in exchange for a greater part of the return on its resources.

Proponents of the present system may argue that it is better for national security if the risk of investment continues to be borne by the private sector. That argument assumes that the federal government should never assume financial risk. To the same extent that a private firm with a large financial base can act as its own insurer with impunity, the same argument holds for the substantial federal reserves.

The risk allocation arguments in this critical area of oil development must be squarely faced. Where a natural resource is largely speculative in its potential and present value, there may be some value in allocating the financial risk of this develop-

226

Id. at 2.

ment to the private sector, but where the resource is as certain of substantial and rapidly appreciating value as are the oil-producing lands of the O.C.S., the argument seems inappropriate.

2. Problems Inherent in Systemic Structure

(a) Is There a Dampening Effect on Competition?

Although by statute the bidding procedure to be utilized should be "competitive bidding" (43 U.S.C. §1337), the "cash bonus fixed-royalty" system contains serious deficiencies in theory and in practice which discourage a truly competitive bidding procedure. The major detrimental impact upon competition involves the de facto exclusion of independent oil producers from viable participation in the bidding procedure.²²⁷ The exclusion occurs primarily at the outset of the bidding procedure with the requirement of the ability both to bid a substantial cash bonus and to actually pay that huge amount at the time of the lease grant. The requirement of a large initial cash payment is a substantial hardship imposed upon independent producers which effectively diminishes the opportunity for competitive bidding. "Good faith" bidders are in effect limited only to large oil producers with substantial ready capital reserves.

227

Committee on Commerce, Outer Continental Shelf Oil and Gas Leasing Off Southern California: Analysis of Issues, request from Senator Tunney, National Ocean Policy Study (Nov., 1974), at 24. Hereinafter cited as National Ocean Policy Study.

The proponents of the present bidding system argue that the initial large payment guarantees the financial stability of the successful bidder. If the concern is truly with a secure financial foundation which will avoid the possibility of subsequent financial disasters, then the focus should be placed upon regulatory limitations on the financial eligibility of competing producers rather than upon the exclusionary device of a large initial payment.

(b) Do the Major Oil Firms Dominate?

According to the National Science Foundation: "While there are numerous small firms in the U.S. petroleum industry, about 20 major, vertically integrated firms dominate the market and participate most actively in O.C.S. lease sales. . . . Historically these few firms have engaged extensively in joint bidding and have exploited other opportunities to share information. Some leasing strategies can increase the likelihood of competition and a fair market return to government-owned resources. Barring the possibility of substantially increasing competition, one must be wary of predicting the outcomes of alternative leasing policies based on models which assume perfect competition." National Science Foundation, Supra at p. 4

3. Problems of Inadequate Government Regulation

In addition to substantially limiting competitive opportunity, the "cash bonus-fixed royalty" system creates potential problems regarding the efficient development of offshore lands

because of the lack of governmental control of the actual exploitation of these lands. All of these potential problems could be substantially mitigated or even eliminated if the Secretary of the Interior pursuant to the authority granted by 43 U.S.C. §1337-1343 exercises his discretion to promulgate stringent regulations regarding the supervision by U.S.G.S. of the actual operating procedures of oil producers as well as the bases upon which the payments of royalties are calculated. Without such regulatory standards, the nation can logically expect that some, if not all, of the following possible inefficiencies will develop.

(c) Is the Rate of Development Too Fast?

The payment of a large sum at the outset of the least grant may encourage inefficient development.²²⁸ It is to the advantage of the successful oil producer to develop the resource as quickly as possible without consideration of long-range efficiency because oil producers are encouraged to seek short-term recoupment of capital investment. From a long-range standpoint, it is also to the oil producer's advantage to develop the resource as

²²⁸ Id. at 40. Effect that the bonus bid system as it presently functions, may have in 'forcing' the development and exploitation of the O.C.S. With the large front end investments required by the bonus bid procedure, it is alleged that the industry is compelled to accelerate its drilling program to recover its investment quickly . . . can lead to hasty ill-conceived developments which may result in environmental damage."

efficiently as possible in order to guarantee a steady, and, indeed, increasing return on investment with the eventual recoupment of the initial outlay.

The latter interpretation appears to be most consistent with efficient business management methods. The possibility of the occurrence of the first interpretation, however, should not be summarily dismissed without thorough consideration of the promulgation of regulatory safeguards which would effectively prohibit rapacious development.

(d) Is The Rate of Development Too Slow?

The payment of a large initial sum and the security of a fixed royalty rate for the term of the lease may permit successful bidders to develop the resource at a slower rate than would be in the national interest. The proponents of this criticism imply that the oil producers would be primarily interested in controlling the input of offshore oil into the supply stream in order to guarantee their own financial advantage. If this view is correct, then the national interest as expressed by the goal of self-sufficiency in Project Independence Blueprint will be substantially threatened, for self-sufficiency depends upon rapid, yet efficient, development of the offshore resources. Regulations affecting U.S.G.S. practices should include safeguards against rates of development based upon the self-interest of oil producers rather than upon stated national goals and policies, and efficient development of our resources.

(e) Are Regulation Procedures Deficient?

Another potential problem arising from the present "cash bonus fixed-royalty" system, and a particularly important one from the viewpoint of the government treasury, is "1980 oil for 1975 prices". Given that the value of oil has substantially appreciated in the last decade and given that the worldwide energy shortage and demand for oil will, in all probability, continue indefinitely, leased lands arguably will be more valuable in 1980 than at present. In practice there has been no thorough review of the exploitation of the leases and as a result leases are seldom terminated.²²⁹ The automatic renewal effect can be countered by regular U.S.G.S. scrutiny of the development of O.C.S. leases by producers coupled with a review process to determine whether leases should be renewed or terminated.

4. Conclusion

The National Science Foundation has concluded:

²²⁹ Id. at 7.

The historical background . . . documents the limited development of leasing policy over the past two decades in sharp contrast with the dramatic changes in economic conditions and social objectives. Specifically past leasing strategies have not been changed in response to increased petroleum prices and development costs or to the increased geologic uncertainty associated with greater reliance on and acceleration of leasing on the O.C.S. In addition, society is considerably more conscious of environmental protection concerns than when leasing policy was established. Moreover, the recent 'energy crisis' has substantially renewed concern with issues of market power in the petroleum industry and with the adequacy and optimal allocation over time of resources. National Science Foundation, Supra, at p.6

The argument above substantiates the need for the Department of the Interior to undertake an in-depth study of the economic²³⁰ and environmental merits of the present leasing procedure. Such an investigation would reveal the problems inherent in continued reliance upon the bonus royalty system for future O.C.S. development and suggest numerous reasons to accept one of the leasing procedures outlined below.

B. Alternative Leasing Systems

Total discretion for the choice of a leasing system resides in the Secretary of the Interior:

230

The Accelerated Development of the Outer Continental Shelf: Its Problems and Costs, prepared for the Ad Hoc Committee on the Domestic and International Monetary Banking and Currency Committees of the House of Representatives (Dec., 1974). See generally Chapter 5. Hereinafter cited as the Banking and Currency Report.

Congress gave the Secretary of the Interior little guidance on the objectives of O.C.S. leasing. The O.C.S. is to be leased 'in order to meet the urgent need for exploration and development,' but the rate of leasing and even guidelines as to how to measure the need are completely unspecified. Bidding may either be on the basis of a fixed royalty and cash payment (lease bonus)--the method used to date--or on the basis of a fixed cash payment and royalty bid--a method which began on an experimental basis in 1974 in Louisiana. In either case, the royalty must be greater than 12 1/2 percent. Sealed bidding and the maximum size and term of the lease are specified, but the Secretary of the Interior is entitled to prescribe any other terms and provisions deemed appropriate prior to offering an area for lease. 231

232

The draft E.I.S. contains a brief discussion of only three alternative leasing systems. These alternatives are: (1) royalty bidding with fixed bonus; (2) net profit sharing; and (3) deferred bonuses. The E.I.S. discussion lacks sufficient economic analysis of the other leasing systems considered to render any of them viable economic alternatives to the present leasing method. Inadequate consideration of alternative leasing systems results in an unreasoned reliance upon the current system.

The National Science Foundation Report, on the other hand, contains a comprehensive analysis of ten alternative leasing schemes. The ten alternatives are grouped for analytical convenience under the three general headings of (1) royalty schemes, (2) rental schemes, and (3) profit-sharing schemes.

231

National Ocean Policy Study, supra n. 227, at 10.

232

Draft E.I.S., supra n. 131, at Vol.II pp. 414-418.

The four royalty schemes are:

1. Fixed royalty/bonus bidding
2. Fixed bonus/royalty bidding
3. Royalty schedule decreasing over time
4. Two-parameter royalty schedule

The four rental schemes are:

5. Rental payments/bonus bidding
6. Fixed bonus/rental bidding
7. Oil pledge/bonus bidding
8. Fixed bonus/oil pledge bidding

The two profit-sharing schemes are:

9. Fixed profit share/bonus bidding
10. Fixed bonus/profit share bidding

Compared to the National Science Foundation treatment of alternative leasing procedures, the draft E.I.S. treatment of the subject is wholly inadequate. We suggest that the Department of the Interior should institute an independent comprehensive survey and analysis of all available expert materials and personnel on the issue of leasing procedures. Until these alternatives have been adequately considered and discussed in the final E.I.S., we suggest that the B.L.M. proceed no further with the leasing process.

We will proceed with a discussion of the general considerations underlying the various royalty schemes because clear statutory authority exists for the immediate implementation of these alternatives. Rental and profit sharing schemes are discussed only briefly. We focus on alternative lease systems here

because there is a very short period of time available to the B.L.M. to seriously consider implementation of an alternative bidding scheme before drafting the final E.I.S.

1. What Are the Alternative Royalty Systems?

The statutory authority for alternative royalty systems is as follows:

The bidding shall . . . (2) at the discretion of the Secretary, . . . or on the basis of royalty, but at not less than the per centum above mentioned, with a cash bonus fixed by the Secretary. 43 U.S.C. §1337.

The draft E.I.S. description of royalties is as follows:

Under royalty bidding leases would be awarded to the firm that pledged to the Government the highest percentage of future production for an individual tract. Therefore, the bulk of federal revenues would accrue from royalty payments made if and when production occurred. 233

Risk under a royalty system is allocated as follows:

For the leaseholder this means that government payments--aside from a nominal fixed cash bonus--depend on production. If the leased property is not productive, payments to the government are not made. Royalty bidding thus means that the risk of an O.C.S. enterprise is shared by both the government and the leaseholder. (Emphasis added) 234

The National Science Foundation Report recommends the following in regard to royalties:

. . . If royalties are to be the principal means whereby the government shares risk with firms, we suggest the following:

233

Draft E.I.S., supra n. 157, at Vol.II p 414.

234

Id. at Vol.II p. 414.

- (a) Riskier areas should carry higher royalties or, better, should incorporate a two-parameter royalty system. The two-parameter system shares risk more effectively without increasing the 'no development' hazard. Royalties should be the same within fields but need not be the same for different fields.
- (b) Royalties should decline through time to reduce early shutdown problems. Initial royalties might be made higher to keep bonus bids at desireably low levels.
- (c) A fraction of costs associated with exploration and development after leasing should be deductible from royalties. If royalties are r percent, the amount deductible should be r percent of exploration and development costs. Otherwise, there will be underexploration and development on leases with consequent loss of production and government revenues. ²³⁵

The only O.C.S. lease to be granted on the basis of a royalty system is a prospective lease to be included in the O.C.S. grant in Louisiana. That test sale is described as follows:

This particular sale is the first in which bidding for leases on a royalty basis will be conducted on a test basis. The O.C.S. Lands Act provides the Secretary of the Interior with discretionary authority to issue leases on the O.C.S. to the highest bidder either on a cash bonus basis with a fixed royalty or on a royalty basis with a fixed cash bonus. The purpose of the test is to determine what the effect of royalty bidding for O.C.S. leases will have on Federal revenues, competition and the rate of production on individual leases. ²³⁶

235

National Science Foundation, supra n. 223 at 35.

236

Draft E.I.S. (Vol. 1 of 2), 1974 O.C.S. Oil and Gas General Lease Sale Offshore Louisiana at 8. Hereinafter O.C.S. Oil & Gas Louisiana.

The specific tracts chosen for the test of the royalty system were selected in this manner:

Of the 295 tracts chosen for this sale, 10 tracts were selected for the royalty bidding test from 10 different trapped hydrocarbon structures. These structures were chosen randomly within the criteria that the structures were to have promising oil and gas potential and that there were to be no tracts under lease on the structure. From the 10 structures, one tract per structure was chosen at random. 237

What, then, are the comparative merits of the cash bonus and royalty systems? Relying on the data produced by this test sale, the B.L.M., which is the agency within the Department of the Interior with the authority to call and to issue leases, soon will have a comparative numerical basis to justify the agency choice of either of the two previously discussed leasing systems. The data will be extremely important for providing a statistical foundation for the choice of future leasing schemes.

An important economic difference between the two leasing systems is that in a royalty scheme the federal government would not reap the initial benefit of a large cash bonus payment. Such a large immediate payment would help bolster present federal budgetary deficiencies. However, in following a royalty scheme, the federal government may, in fact, reap greater total monetary benefits over the lifetime of the lease because of the higher percentage rate of royalties.

237

Id. at 34.

The assumption of greater return to the federal government over a longer period of time in turn rests upon the belief that the price of oil will continue to rise. That assumption of continued higher prices continues to be the source of learned controversy:

A royalty is a payment based on a specified fraction of the production of a lease. Royalties are contingent payments in that they are paid only if oil is produced on the lease. Royalty payments also depend upon the current market price of oil and thus share price uncertainties as well as discovery risk. Current legislation requires royalties of at least one-eighth (12 1/2 percent) although O.C.S. leases typically require royalties of one-sixth (16 2/3 percent). 238

There is adequate current information, however, that would lead to the conclusion that the value of oil is more likely to increase between 1975 and 1980 or, at least, to remain at its presently high level, rather than decrease. The risk to the federal government, therefore, would be rather minimal.

The inordinately rapid rise in oil prices in the last decade, on the other hand, may be logically attributed to the effect of market manipulations by foreign oil producers.

There was a gradual increase in relative strength of O.P.E.C. but that increase was not fully evident until 1970 when tightness developed in world oil markets. Choosing their targets carefully, exporting countries selected vulnerable companies (those without ALTERNATIVE SUPPLIES) and improved transfer prices in one area over another. The resulting TEHERAN-TRIPOLI joint agreements of 1971 not only raised the price of oil but also created uncertainty about future prices and signaled a fundamental

shift in the bargaining strengths of the two parties. 239

The public concern and awareness of the market changes and the concomitant domestic fear of extremely high gasoline prices is reflected in these words from Ernest Conine of the Los Angeles Times Editorial Board:

The bald fact is that no amount of wisdom emanating from next week's economic summit is really going to bring inflation under control as long as the Arab-dominated oil cartel keeps world petroleum prices at their current outrageous levels. 240

Although some attention must be focused on these artificial causes for the rise of oil prices, primary concentration should be placed on other stable factors which will continue to uphold high prices. These factors include the worldwide energy shortage and related demand for oil and the increasing industrialization of heretofore underdeveloped countries.

Oil is an extremely valuable natural resource. This fact has been repeatedly emphasized by conservation groups who use this high value and the exhaustible nature of oil to bolster arguments in favor of preservation of resources rather than immediate wholesale development. These concerns were expressed at

239

Ad Hoc Committee on Domestic and International Monetary Effect of Energy and other Natural Resource Pricing, Oil Imports and Energy Security: An Analysis of the Current Situation and Future Prospects (September, 1974), at 4. Hereinafter cited as Oil Imports & Energy Security.

240

L.A. Times, What Can Oil-Consuming Nations do to Pressure Arab Producers? (September 18, 1974).

a previous hearing in this manner:

Mayor Dostel approached conservation from another angle. He considered offshore oil and gas deposits as resources to be preserved for future use and posed the rhetorical question:

'Shall we continue to deplete this natural, irreplaceable resource because it is expedient or should we preserve it for a time when we or future generations may find it to be of a more critical nature than it is today? . . . ' 241

If the presumption holds that oil values will continue to rise, then the conclusion is apparent that a royalty scheme will realize greater monetary rewards for the federal government over the total time of the lease than a cash bonus system.

(a) What is the Likelihood of Abandonment
of Leases and Premature Shut-Downs?

The major problem foreseen for royalty schemes is the possible total abandonment of leases or premature well shut-downs by the oil producers when a downward trend in production revenues develops. The draft E.I.S. states the economic basis for this consequence:

A royalty bid is calculated so that the firm will retain just enough out of expected production revenues to yield a normal rate of return on production investment. 242

The National Science Foundation Report discusses this problem as a disadvantage of royalty schemes:

241 National Ocean Policy Study, supra n. 227, at 36.

242 Draft E.I.S., supra n. 157, at Vol.II p. 415.

Early shut-down hazard economic (social) efficiency requires production to occur until marginal costs equal price. Royalties raise marginal costs above their market level, leading to premature stoppage of oil lifting on a lease. The extent to which this occurs depends upon the actual cost curves and upon tax allowances, subjects which require empirical investigation.²⁴³

As the E.I.S. points out, however, this problem is probably ephemeral because prudent business practices would dictate the incorporation of this cost into the initial royalty bid. The National Science Foundation Report recommends, "Royalties should decline through time to reduce early shut-down problems."²⁴⁴

(b) Will Inefficiency Result from an
Inadequate Resource Base?

Another problem raised by critics of royalty schemes is the suspicion that if this bidding makes competition more of a true reality, then independent oil producers might be successful bidders and raise the possibility that, because of their smaller size, they would be unable to meet the financial burden of unexpected emergencies. The E.I.S. frames the problem in this manner:

The most efficient firm may not get the lease under royalty bidding. Any firm can bid a high royalty. If an irresponsible bidder is awarded the lease there may be significant adverse environmental consequences. In the event of a spill or blowout, the firm may lack the resources necessary to prevent widespread damage.²⁴⁵

²⁴³

²⁴⁴ National Science Foundation Report, supra, n. 223, at 35.

Id. at 35.

²⁴⁵

Draft E.I.S., supra, n. 131, at Vol.II p. 16.

There are two obvious solutions to the problem. In the case of an emergency, the federal government could intervene and clean up under the regional or national Oil and Hazardous Substances Pollution Contingency Plan. A more thoroughgoing solution would reside in standards established, prior to bidding, for the eligibility of producers based upon a minimum capitalization or other relevant stability criteria.

(c) What are the Administrative Costs?

Will there be a Failure to Develop

Lands?

Will there be Suboptimal Extraction?

Will there be Underexploration?

These last four possible problems apply to all leasing schemes, as well as to royalty schemes, because of the necessity for effective agency participation and regulation. As discussed elsewhere, the Department of the Interior should take a much more active role in conducting independent exploration and in regulating the oil producers at all significant stages in oil production. The B.L.M. should be assigned the task of contracting for independent government exploration reports and evaluations, or of negotiating a program of federal exploration and development. The U.S.G.S. should be instructed to thoroughly scrutinize, develop, and review its operating procedures which relate to effective regulation and supervision of the oil producers.

These recommendations for alternate royalty systems will

result in greater administrative costs. Yet such an expenditure will be readily offset by the increased revenue realized by the federal government through more accurate initial evaluations of the true value of leased lands, as well as through more effective regulation of the bases on which royalty payments are made.

2. Although Without Present Statutory Authority,
What are Other Alternative Leasing Schemes?

(a) Rental and Oil Pledge Schemes

Like other schemes, rental and oil pledge schemes serve to transfer risk from the lessee to the government. The crucial questions are whether the schemes share risk as effectively as others and whether they have undesirable side effects.

Rental schemes may not share risks as effectively as royalties. Both avoid large bonus bids. Yet rental schemes may require large payments before firms fully realize potential revenues and/or costs of developing a lease. Royalty schemes, in contrast, require payments only when production commences on a lease and depend upon current market prices. Oil pledge schemes also gear monetary payments to prevailing market prices and seem preferable to rental schemes denominated in money terms.

Some claim that rental or oil pledge schemes avoid the under investment and early shut-down hazards which plague royalty schemes. That claim is incorrect. There may be an early shut-down problem with rentals or pledges, and high marginal costs per unit time (rather than per unit output) may lead to premature

abandonment of leases. Yet, there are some real advantages to rental or oil pledge schemes. The schemes are simple to administer. Such information is valuable in deciding whether to meet the next rental installment; there is thus some incentive to rapid exploration. Costs of production may be such that early shut-down is not a substantial problem when compared with a royalty scheme sharing an equivalent amount of risk. Further empirical work is required to decide between royalty and rental schemes, although both schemes may be dominated by profit sharing.

As with royalty bidding, we would suggest caution with respect to rental or oil pledge bidding. If bonus requirements are low, there is the serious hazard of speculative bids leading to underdevelopment of desirable areas. If bonus requirements are high, the scheme will not dominate fixed rental payments, leading to possible distortions in production on adjacent leases.²⁴⁶

(b) Profit Sharing Schemes

As noted in the E.I.S., the main problem with the profit sharing schemes is that current law apparently does not provide for this method.

The Solicitor's Office of the U.S.D.I. has indicated that a bidding system of this kind is possible under the current law if:

regulations are changed to define royalties as percentage of something equivalent to net profits; firms bid on the basis of the royalty rate (percentage of net profits) they are willing to pay.

247

246

National Science Foundation Report, supra n. 223, at 43-44.

247

Draft E.I.S., supra, n. 157, at Vol.II p 417.

Nevertheless, as the National Science Foundation Reports suggests, these schemes have substantial advantages:

There are some very substantial benefits to profit sharing schemes. They are unequalled as a means of transferring risk to the government for any given level of expected bonus bids. They have no undesirable side effects as long as the stipulated profit base adequately measures true profits. Indeed, one could view a profit sharing plan much as a corporate profits tax but applied to each lease. A desirable feature of corporate profits taxes, as contrasted with excise or other taxes, is their 'neutrality' in affecting the firm's decisions.

The potential disadvantage of a profit sharing plan is that profits may be difficult to measure accurately. How should exploration costs for an entire area be allocated to individual leases? How can overhead costs be allocated? What is a 'fair return' to internally raised capital? These and other questions arise in any situation in which profits must be defined. Providing a strict formula for computing profits has the advantage of minimizing administrative costs and litigation. But strict formulae often fail to capture true profits. Using such formulae may then give misincentives to the firm's decision-making.

Unless care is taken in designing the profit sharing plan, large firms may have an advantage over small firms. This is because losses on a lease are partially reimbursed if they can be used to offset other profitable ventures. A small firm may have no other profitable ventures, implying that they will not receive an offsetting subsidy on their losses. To realize such subsidies under current tax laws, they would be forced to merge with larger firms, thereby reducing competition. Appropriate government policy therefore will be to pay actual compensation if tax offsets are not available. A fully effective scheme would require further research in conjunction with accounting and legal experts.

In sum, the potential economic advantages of profit sharing schemes would seem to warrant a full-scale study of the most efficient ways to implement it. If administrative costs using these ways are still excessive, for the appropriate level of risk sharing, then policymakers should consider some alternative scheme such as

higher royalties or oil pledges with provisions for deducting some portion of exploration and developments costs. 248

The mathematical theorems and proofs which follow the text of the National Science Foundation report conclude with this summary in favor of profit sharing:

Discussion: Our proof indicates that profit sharing will generally be a more effective way of sharing risk than are royalties. Profit sharing has two further advantages over royalties:

1. Exploration and development expenditures will not be distorted;
2. Tracts which would be leased with no profit share will also be leased with any profit share less than one. With royalties, however, the government risks setting a royalty so that bids fall 'below zero', i.e. the tracts are not leased. 249

The E.I.S. suggests that profit sharing schemes present problems under existing tax laws:

'The advantages of a net profit sharing system are realized only when:

1. 'Net profits' are defined as net income on property after taxes.
2. Net profit payments are a share of 'net profits' involving a return on investment in excess of a normal rate of return.

These two conditions are not valid under current tax law. Net profit payments must be calculated prior to tax liability because they are considered as deductions from gross income on property. The second condition above requires a definition of exploration and capital costs distinct from that now used for tax purposes. 250

248

National Science Foundation Report, supra n. 223, at 46-47.

249

Id. at 77.

250

Draft E.I.S., supra, n. 157, at Vol.II p 418.

3. Deferred Bonus System

The deferred bonus system, described in the E.I.S., is a variation on the current leasing system. Such a system can potentially alleviate some of the anti-competitive effects of the present system but it also must be carefully examined for other detrimental effects resulting from the present system. The National Science Foundation states:

Under a deferred bonus system, firms still compete on the basis of bonus payments but with the understanding that the bonus payment will occur over time rather than in one lump sum. For this system to conform to the present law, the bonus payment must be defined as the rental payments during the first five years of the lease. Under this system, the equivalent to current bonus payments would be six times what the firm bids--the bonus payment plus the first five rental payments.

There is really no shifting of the risk in O.C.S. development from the leaseholder to the government under deferred bonuses. Payments to the government are made during the lease's non-productive years and regardless of whether or not production ever takes place.

The advantage of deferred bonuses is that they provide relief to the smaller firm. Such a firm, which might be an efficient and responsible producer, may be at a competitive disadvantage under the current system because of the difficulty it will encounter in trying to assemble the huge sums--from either retained earnings or the money market--now needed to make cash bonus payments during the first year of the lease. The relief is in the form of spreading out the cash flow involved in paying for the right to explore and develop O.C.S. leases. 251

4. Conclusion

The current leasing process has severe detrimental effects both upon competition and upon the return to the federal government of a fair market value for federal O.C.S. lands. We suggest that another leasing scheme be chosen to mitigate such adverse effects upon the national interest. The additional alternative methods of leasing discussed above, especially the profit-sharing methods, offer strong viable alternative leasing procedures for O.C.S. lands. We suggest that other leasing methods be considered in depth by the B.L.M. before any further effort is made toward granting any O.C.S. lease.

C. Receipt of Fair Market Value

The concern for receiving fair monetary return upon the utilization of national energy resources permeates the entire discussion of O.C.S. development. If the people of the United States are to release these lands for the production of oil, it should be assumed that the national treasury will be as fully recompensed for this use as can be accomplished by reliable economic analysis and adequate regulation.

The U.S.G.S. is the branch of the Department of the Interior granted the authority to regulate oil production. There was a significant economic and scientific study of the operating procedures of this agency done by the Comptroller General of the

252

United States in February, 1972. The findings of this study, referred to herein as the Comptroller General's Report, will be summarized in this discussion as substantive evidence of the inadequate regulation which has historically characterized U.S.G.S. activity. While many abuses cited in this report have probably been corrected by now, they provide a general perspective on future U.S.G.S. regulations.

The Ad Hoc Committee on the Domestic and International Monetary Effect of Energy and Other Natural Resource Pricing prepared a report for the House of Representatives on December of 1974, titled The Accelerated Development of the O.C.S., Its Problems and Costs. Chapter III of the report directs itself to the problems in management, wherein it states that

The major conclusion of the paper is that the Department of Interior has been unable to properly manage the current O.C.S. leasing program and will undoubtedly commit even greater disservices to the public interest under the accelerated leasing schedule.

According to the report, the mismanagement results from a variety of factors: an artificial division of function within the agency and a lack of communication between various divisions; understaffing of the agency and consequent reliance on the oil and gas industry for information; serious undervaluation of the worth of a particular tract; inadequate follow-up after a lease sale; and an inability to verify industry justifications for shut-

ting in a producible well. In the words of Congressman Rees:

The baseline studies and the call for nominations place the responsibility for O.C.S. development into the hands of the oil industry . . . The pre-sale evaluations are often far below what the oil firms are willing to pay . . . And the draft environmental statements are often rush jobs . . . The problems are due to the relationship between the B.L.M. and the U.S.G.S. staff limitations. . . and a general impatience in the Department of Interior.

Thus, the Congressman concludes that there appears to be no evidence that the B.L.M. plans to deviate from its current nominations process.

Future O.C.S. developments will therefore, guarantee that industry interests receive a greater hearing than the public interest. Nor does it appear, at this point, that the Department of Interior is going to alter the accelerated leasing schedule--in spite of an avalanche of criticism and objections from the coastal states, environmentalists and other interested parties.

Prior to 1961, agency personnel of U.S.G.S. were "operating without a manual containing precise and up-to-date instructions, methods, and procedures."²⁵³ There was no general standard by which such personnel could base their judgments or by which the agency could compare the activities of the personnel throughout the United States.

The Oil and Gas Operations branch of U.S.G.S. issued a manual for personnel in 1961 which consisted "primarily of copies of memorandums--some of which were written as long ago as 1937--on oil and gas activities. Many of these memoranda merely point out how certain cases have been handled and do not provide

253

Id. at 6.

definitive policies for the determination of royalty payments under all situations.²⁵⁴ The manual had the effect of providing no general standard which would lend uniformity to the decisions made pursuant to its provisions and resulted in reliance upon diverse judgments with no apparent organization of the reasoning which should characterize such decisions.

The lack of reasoned and uniform standards resulted in several crucial disparities in the functioning of the U.S.G.S. in this regulatory context. The inadequacies bore specifically on factors which were necessary to the formation of an accurate evaluation of the value of the oil as it was used by the oil producers in calculating the royalty payments due to the federal government. Initially, no uniform value basis was established for the actual, or market value of the oil by which the federal government could perceive whether or not the oil producers were selling the oil at a reasonable rate.

. . . In those cases where there is very limited or no competition for oil in a given area or where there are significant differences between the sales prices obtained and those of comparable oil in nearby fields, we believe it essential that Survey Officials consider all pertinent facts and circumstances involved in establishing the sales prices and consider whether the prices are reasonable for use as the basis for computing royalties. 255

In addition to different values being used as the basis of the sales, there were also significant differences in the

254 Id. at 6.

255 Id. at 6.

amounts claimed by oil producers for the deduction allowed for transportation costs:

'The lack of specific guidelines for considering transportation allowances has resulted in regional officials' considering and evaluating transportation costs on such bases as they deem reasonable. In our opinion, this situation has led to inconsistencies between regions and in some cases within regions, in allowing transportation costs.²⁵⁶

A third major disparity arose in the determination of the volume of oil upon which the royalty was paid:

The lack of specific policies and procedures for use on an agency-wide basis has resulted in numerous inconsistencies in the manner in which regional oil and gas supervisors have carried out their responsibilities for ensuring that royalties were based on (1) values which approximate the fair market value of the oil, (2) deductions for transportation costs which did not exceed actual costs, and (3) total quantities of oil marketed.²⁵⁷

As a result of this study, the Department of the Interior directed that the manual be amended and that criteria and standards be developed for the factors enunciated above. Given past history, we suggest that the Interior Department insist that the U.S.G.S. continue to scrutinize and appropriately revise the regulatory procedures applicable to oil production. We also recommend that another agency outside U.S.G.S. conduct periodic evaluations of the effectiveness of U.S.G.S. regulatory practices and procedures.

²⁵⁶ Id. at 21.

²⁵⁷ Id. at 27.

D. Participation by the Federal Government in
Exploration and Development

Past difficulties with the leasing system and its regulatory procedures indicate the necessity of participation by federal government officials in conducting initial explorations and evaluations of O.C.S. lands. Without such an independent governmental decision, the federal agencies are forced to rely upon information from the private oil companies, information which is subject to significant constraints because of the impact of the proprietary privilege problem:

The history of O.C.S. leasing indicates that the process of selecting the areas to be explored and leased has been left to the discretion of the industry . . . For one thing, we must note in passing that the companies involved have more than a little opportunity to use inside information and contact in getting those areas put up for lease on which they can then bid to best advantage . . . But, even more important, it means that the buyers in a government sale have far more information than the seller, as to the value of the item sold. ²⁵⁸

Also, coastal planners have little concrete resource information from which to estimate future development pressure. Detailed planning does not normally begin until information about oil and gas resources and anticipated development passes along a slow and reluctant path from industry to the federal government and, thence, in only vague outlines, to the public. Ideally,

however, such information should be obtained even before offshore tracts are leased. This would be possible if the federal government were to conduct its own detailed seismic studies and exploratory drilling.

Some have debated whether the Department of the Interior possesses the authority to conduct independent exploration and evaluation. At previous hearings in Santa Monica, this dialogue took place:

. . . Deputy Solicitor Lindgren concurred that in his opinion the O.C.S. Lands Act established the policy that exploration and development should be done by the private sector and not by the United States Government itself:

'to do our own exploration, to contract for exploratory work to be done for us would require additional authority from Congress"
(at 206 Official Transcript)

. . . Mr. Canfield of G.A.O. was not as certain that the O.C.S. Lands Act did not contain the implied authority for the Department of the Interior to explore:

'I am not certain I can point to the line saying they don't have it . . . (but) if the Solicitor's Office feels they don't have the authority, the chances are good they won't experience it.' (at 243 Official Transcript) 259

If this delegation of authority issued is resolved affirmatively by the Solicitor General's Office in favor of implied authority to explore, then the Department should consider taking steps to implement this authority. Otherwise, seeking such legislation should be evaluated.

The economic issues discussed above are basically concerned with the optimal preservation of the national interest.

259
Id. at 39-40.

It is conceded that the private sector will need the incentives provided by the opportunity to profit from exploitation of the O.C.S. leases but this profit margin should be substantially limited by active government participation in as many crucial stages as possible. These lands will reap such large monetary rewards that it is reasonable to assume that both the public and private sectors can experience substantial monetary benefit. Monetary reward, however, must not be the only concern of either private or public bodies. Throughout this analysis, a strong emphasis has been placed upon protection and conservation of environmental interest and upon an orderly and rational development which would spread the benefits and minimize the burdens of O.C.S. development. In recognition of these concerns and the overriding problem of meeting the self-sufficiency goal of Project Independence, this analysis would agree with Deputy Solicitor Lindgren when he said, "While the concerns of and impacts on the people and governments of Southern California are important factors in the decision, in the final analysis, the decision must be made from the perspective and the needs of the nation as a whole."²⁶⁰

260

Id. at 41.

V. PROCEDURES FOR EVALUATION

A. Limitation on Public Participation

1. Short Time Frame for Public Review and Comment

Given the enormous impact of O.C.S. development, we must express our concern over the limited time frame permitted for public review and evaluation of the proposed action. The Draft E.I.S., released in October of 1974, is a massive 1300 page document. Upon the release of the E.I.S., the Department of the Interior also announced that public hearings would be held in two or three weeks.

The hearings, however, had been announced before most state and local agencies had even received the draft E.I.S. On behalf of the City of Los Angeles, City Attorney Burt Pines sent a letter to Secretary of the Interior Morton objecting to the lack of time to review the E.I.S. before the hearings. The City was soon notified that the hearings would be postponed for two weeks until early December.

Soon thereafter, the draft E.I.S. was received by local agencies who quickly realized that the magnitude of the program was immense and would have far-reaching consequences that deserved extensive review and examination prior to public hearings. Additionally, in mid-November, 1974, the Federal Energy Agency released the Project Independence Blueprint, an 800-page document which made recommendations to the President for the formulation of a national energy policy.

The time frame in which to evaluate both documents and to solicit scientific expertise was thus totally inadequate. Twenty-five local cities and counties formed a coalition (The Southern California Council of Local Governments) in order to appeal to Secretary Morton for a postponement of the public hearings in order to provide local agencies with adequate time to review the draft E.I.S. and Project Independence Blueprint. Elected officials also expressed their concern, including United States Senators from California and a number of Congressmen. The Department of the Interior, however, evidenced no intention to slow down the decision-making process or to open it up to local input. Ultimately, state and local agencies concluded that, unless an accommodation with the Secretary of the Interior could be reached, the only alternative would be to seek a court order compelling the Department of the Interior to provide the necessary time for a full and adequate public hearing.²⁶¹ Just before the suit was to be filed, Secretary Morton met with Los Angeles City Attorney Burt Pines, Senator Tunney and Congressman Bell, and granted a two-month postponement.

2. Hearing Topics Balanced in Favor of O.C.S. Development

In December, local agencies received notifications setting forth the procedures by which the hearings rescheduled for February 6, 7, and 8, would be conducted.²⁶² The notice contains several procedures which limit public participation

²⁶¹

The Administrative Procedure Act, 5 USC Section 553, 554.

²⁶²

See General Information Regarding Conduct and Procedures of Hearings Rescheduling of Hearings, United States Department of Interior, Bureau of Land Management, Hereinafter referred to as the Memorandum. (December, 1974).

and inquiry. One of these limitations is the focus at hearings upon topics which favor O.C.S. development.

The Interior Department, in outlining the scope of the hearings, expressed the hope that six general issues would be fully addressed. Of the six topics that are specified, four will almost certainly result in favorable industry testimony. They are:

- (a) Domestic and commercial need for the (oil and gas) resource;
- (b) Industry interest in the proposal;
- (c) Conflict between user (oil and gas companies) groups;
- (d) Economic benefits from oil and gas.²⁶³

Submission of oral testimony and written documents on these issues would over-emphasize the possible economic benefits of offshore drilling, a result contrary to the very purpose of an environmental impact statement. As set forth in N.E.P.A., an environmental impact statement is a detailed discussion of: (a) the environmental impact of the proposed action; (b) any adverse environmental impact of the proposed action; (b) any adverse environmental effects which cannot be avoided should the proposal be implemented; (c) alternatives to the proposed action; (d) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and (e) any irreversible and irretrievable commitment of resources

263

Id. The other two areas listed in the Memorandum are (E) environmental and conservation, (F) geologic conditions as they affect safety and protection from environmental pollution.

which would be involved in the proposed action should it be
264
implemented.

The purpose of the public hearings is to receive oral and written comments on: (1) the Draft E.I.S. and its deficiencies; (2) the potential adverse environmental effects of the proposed agency action; and (3) the possible alternatives to the proposed action. Such a document is meant to assist federal, state and local officials in evaluating the social, economic and environmental costs of federal action. The E.I.S. and the procedures to evaluate it are meant to attain a socio-environmental balance with economic growth.

As stated in Sierra Club v. Froehlke, N.E.P.A. (Section 102(2)(D) 42 USC 4332(2)(E) is an environmental disclosure law which is intended to assure consideration of environmental factors in decisionmaking, even though conflicting with other federal objectives.²⁶⁵ Striking a socio-environmental balance with economic growth is indeed difficult. Objectivity is essential to ensure that competing interests are meaningfully considered. "Objectivity is required of federal agencies with respect to all environmentally related activities relating to the evaluation of environmental impact, including the selection of consultants, undertaking environmental studies, reliance upon such studies, creation of environmental assessments and coordination with reviewing agencies and preparation

264

The National Environmental Policy Act of 1969 (hereinafter referred to as N.E.P.A.) Section 102(2)(C), 42 U.S.C.A. Section 4332(2)(C)(i)-(v).

265

Sierra Club v. Froehlke, 359 F. Supp. 1289 (1973).

of impact statements."

Unfortunately, the Interior Department seems to have tipped the scales in favor of O.C.S. development in the procedures adopted for the public hearings. Possible alternatives to the proposed action are superficially mentioned. No consideration is given to the irretrievable harm to marine life that would result from offshore drilling, nor are numerous other environmental considerations addressed.

As a result of the questions proposed regarding economic benefits, more deference may be afforded to industry testimony which can address the specific issues outlined by the Interior Department. Participation by private citizens or state and local governments as to those issues is hampered because of the lack of relevant data. Such an over-emphasis on economic benefits will have the effect of justifying O.C.S. development without giving full consideration to potential adverse effects.

3. Inability to Ask Questions of Panelists At Hearing

Only panel members, each of whom is from the Department of the Interior, are allowed to ask questions. Participants testifying may not query the panelists. In addition, audience participation is severely limited. If a member of the audience wishes to ask a question, the individual must submit the question in writing to one of the panelists. This procedure does not ensure that the question will be answered.

The Los Angeles City Attorney's Office has inquired of Mr. William Grant, Regional B.L.M. Director, as to why witnesses or members of the audience are not allowed to verbally ask questions. He indicated that B.L.M. and the Department of the Interior considered the hearings to be informational. That response has two relevant implications: (1) the Interior Department views these hearings as a means of gathering information and not as a means of providing information to the public; (2) it removes the Department of the Interior from public accountability.

We disagree with the characterization of public hearings as a one-way informational street. Public hearings should be informative to all participating parties. Inquisitive discussions which yield relevant information should be the premise of rational decisions. By prohibiting witness and audience questions, the Interior Department invalidates the meaning of public hearings.

In addition, the Interior Department also insulates itself from public inquiry, and thereby eliminates any means by which private citizens can meaningfully participate in the decisionmaking process. How can the public be assured that the Interior Department is protecting the national interests? How can the public hold the Interior Department accountable for its actions if there are no mechanisms for inquiry into the decisionmaking process? If inquiry into the decisionmaking process of the Interior Department is prohibited, how

can the public be assured that the department's decision to allow offshore drilling is not an abuse of discretion?

In order to assure impartiality, the public should be informed of the panelists' background and scientific expertise. In addition, because these hearings are for the purpose of evaluating the draft E.I.S., the public should be informed as to whether any of the panelists have personally contributed to, or written parts of, the Draft E.I.S.

4. Restrictions on Testimony

A number of restrictions with respect to oral testimony have also been imposed. Speakers, for example, are required to submit advance written requests for speaking time, a procedure which favors organized groups who have time, money and ability to maintain a constant vigilance of proposed agency action. Such procedures may result in excluding private citizens who do not belong to such organizations.

Speaking time for each witness is limited to ten minutes, a restriction which prevents any one speaker from dominating the hearings. An application for time extensions, however, may be submitted to B.L.M. Unfortunately, B.L.M. has failed to establish any criteria for granting or denying such time extension applications. As a result, private citizens may not be able to successfully compete with organized interests for extended speaking time.

Another mechanism which inhibits public participation is the procedure for scheduling speakers. Individuals will not receive notice of the time of the testimony until just prior to the hearings, as a result of which the quality of preparation and actual testimony before the Department of the Interior panelists may be affected. Not knowing the order of testimony until just prior to the hearings also results in a significant obstacle to private citizen participation. Those citizens who wish to testify will be inconvenienced as to approximate time and date of potential appearance. Private citizens who do not submit an advanced written request will be required to hold three days in abeyance until an open time-slot is available. Many private citizens will not be able to participate as a result of time and monetary constraints.

The Department of the Interior states that only one spokesperson shall be allowed to speak on behalf of an organization. If, however, the organization is a "multiple-member" group, an application may be made to the Department to have additional speakers.

The limitation of one spokesperson is an administratively sound restriction in order to free more speaking time for other interested parties. The value of such a restriction, however, may be nullified by allowing additional speakers under a "multiple-member" group classification. The Interior Department does not define a "multiple-member" group. We would like to know the basis on which the Department of

the Interior decides what a "multiple-member" group is. Interest? Size? Potential influence? Diversity? For example, on what basis does the Interior Department determine whether the Friends of the Earth or the American Petroleum Institute are "multiple-member" groups? Thus, without other clarification, the Interior Department internalizes the important decision as to which organizations qualify for additional speaking time, a decision which affects the fairness of treatment for large organized interests as well as private citizen activity.

5. Notice

"Although not bound by the same rules of procedure as courts, administrative agencies are governed by the same basic requirements of fairness and notice, including specificity of notice and opportunity to respond . . .".²⁶⁷ The Department of the Interior has met these requirements only in form in the procedures set forth in its notice of time, place, and general issues to be discussed.

A basic element of a fair hearing is notification of the substantive issues to be examined. As previously discussed, the purpose of these hearings is to receive oral and written testimony regarding the Draft E.I.S. In order to be able to offer these comments, an interested party must have access to the Draft E.I.S. As of January 8, 1975, conversations with representatives of the City of San Francisco

²⁶⁷

Hess and Clark, Division of Rhodia, Inc. v. Food and Drug Administration 495 F. 2d 975 (1974).

indicate that city officials had not yet received notification of the February hearings, nor had they received copies of the Draft E.I.S. Attempts to obtain a copy from the Department of the Interior had been unsuccessful. Even if city officials were able to obtain a copy of the Draft E.I.S. by January 8, 1975, less than 4 weeks would be left for them to evaluate and prepare any comments they wished to submit.

In addition, we are informed that the Department of the Interior may publish an addendum to the Draft E.I.S., but that it would not be available for public scrutiny until just prior to the hearings. Unless additional public hearings are scheduled to allow for evaluation of the additional material, the public participation section of N.E.P.A. will be frustrated. The United States Supreme Court has held that a hearing. . . "must be a hearing in substance and not just in form."²⁶⁸

6. Conclusion

We contend that the Interior Department has failed to establish a decisionmaking process which allows full, fair, and equal participation to all interested parties. As Chief Judge Bazelon stated in International Harvester, "The best way for courts to guard against unreasonable or erroneous administrative decisions . . . is to establish a decisionmaking

²⁶⁸

Radio Corporation v. F.C.C., 326 U.S. 327 (1945).

process which assures a reasoned decision that can be held up to scrutiny of the scientific community and the public." ²⁶⁹

Such a process must occur prior to any decision to lease in the O.C.S.

269

International Harvester v. Ruckelshaus, 478 F. 2d 615 (1973) at 652. Cited with approval in Hess and Clark, Division of Rhodia, Inc. v. Food and Drug Administration, 495 F. 2d 975 (1974).

B. The Leasing Process and the Department of Defense

Claims of national security by the Department of Defense have resulted in large areas of potential prime leaseland being excluded from consideration by the Department of the Interior. As a result, other areas, perhaps more environmentally sensitive, may have been designated for potential lease sale. These claims of national security must be carefully reviewed. We turn now to the experience of the Southern California designation process and the role of the Department of Defense.

1. O.C.S. Department of Defense and Southern California

On July 11, 1973, the B.L.M. promulgated a proposed leasing schedule for 17 designated areas, including an identified area off the Southern California coast scheduled for lease sale in May, 1975.²⁷⁰ On August 30, 1973, the Assistant Secretary of Defense (Installation and Logistics) requested the Department of Navy and the Department of the Air Force to submit comments on the Interior Department's proposed oil and gas lease sale.²⁷¹

The Air Force Department responded with a memorandum dated September 24, 1973 which stated that any Air Force activities affected by the proposed drilling were centered at Vandenberg Air Force Base, California. Apparently, the Air Force and the oil companies had been conducting missile launch operations in concert with drilling activities since 1968. "In practice, a very satisfactory level of cooperation has been established between the Air Force and the companies conducting drilling operations."²⁷²

²⁷⁰

38 Federal Register 18473, July 11, 1973, at 1.

²⁷¹ Memorandum for the Assistant Secretary of Defense (Installation and Logistics). The Dept. of the Navy, Oct. 4, 1973, hereinafter referred to as Navy Memorandum.

²⁷² Memorandum for the Assistant Secretary of Defense (Installation and Logistics) The Dept of the Air Force, Sept. 24, 1973, hereinafter referred to as Air Force Memorandum, at 1.

The Air Force concluded that mutual use of the proposed lease land would not hinder its operations or jeopardize the quality of its performance.

In contrast, the Department of the Navy asserted that a large portion of the Southern California coast is necessary for the exclusive use of military operations. In a classified memorandum,²⁷³ the Navy Department stated that the total proposed nominations overlapped the so-called Southern California operating areas where a multiplicity of military operations and functions occur. According to the memorandum,

It must be divided therefore into:
exclusion areas where there is no likelihood
of compatible use short of relocation that
would be considered either impractical or
unreasonable from a national security or cost
viewpoint.

Joint Use Areas where both interests can
operate side by side provided certain pre-
cautions are taken and conditions met, and
. . . . Free Use Areas where there would be no
objection to exploration or exploitation in-
side the 100 fathom curve. 274

After the Navy and Air Force memoranda had been received, the Department of Interior evaluated the recommendations along with the proposed lease sites. With respect to the Outer Continental Shelf, the armed forces have no jurisdiction. Jurisdiction is vested in the Department of the Interior under the O.C.S. Lands Act of 1953. On the other hand, the Secretary of Interior

273 Navy Memorandum at 318. The Memorandum was classified by CND COP - 943 and declassified on Oct. 9, 1973 by authority of Capt. G.M. Johnson.

274 Id. Navy Memorandum at 318.

has responsibility under the O.C.S. Lands Act to schedule leasing in the best interest of the government. Thus, under Department of Defense Directive No. 3100.5, resolution of military and industry differences is made dependent upon negotiation under the supervision of the Interior Department.²⁷⁵

On November 26, 1973, B.L.M. designated 7.7 million acres off Southern California for potential lease sale.²⁷⁶ Apparently, the Interior Department accepted the Navy Department's classifications since the proposed lease land did not contain any of the recommended exclusion areas.²⁷⁷ In order to accommodate the naval exclusion lands, and to meet the accelerated leasing program of the Department of the Interior expanded the total square mileage of the proposed lease area by expanding the coastal boundaries northerly, southerly and westerly. Amid the proposed O.C.S. lease area, the Department of Interior fashioned borderlines which designated naval exclusion areas.

2. Problems Posed By Exclusion

Under the O.C.S. Lands Act and Department of Defense Directive No. 3100.5, the Interior Department is responsible for scheduling lease sales in the best interest of the government

²⁷⁵ Id. at 2.

²⁷⁶ Federal Register (November 26, 1973).

²⁷⁷ Navy Memorandum, n. 271, at 2.

and for resolving industry differences through negotiations.²⁷⁸

These responsibilities of the Department of the Interior mean nonpublic decisions about important matters and the loss of potential O.C.S. development acreage.

First, undefined parameters of authority are granted to the Department of Interior to unilaterally exclude areas along the O.C.S. under the guise of national security, thereby insulating important decisions affecting the environment from public accountability. Such a provision internalizes the mechanisms for resolving a conflict. This aura of secrecy challenges the rationality, the basis, and the validity of the resolution.

We suggest that important questions should have been examined prior to any decision to exclude O.C.S. land by the Interior Department. What inquiries, for example, did Interior Department launch in order to ensure that the Navy Department's contentions were meritorious? What mechanisms can the Interior Department exercise to assure that any possibility for mutual use is considered? Did the Interior Department assume its public responsibility and question the primary motivation of the military and industrial representatives in order to ensure that self-interest was not the controlling factor? The validity of military and industrial requests should at least have been examined. Without mechanisms for public hearings or some form of accountability, resolution of conflicts in matters affecting the public interest lose credibility.

278 Air Force Memorandum, n. 272, at 1.

A second problem is the exclusion of potential O.C.S. lease areas under the guise of national defense. A study of the Department of the Navy and the Department of the Air Force memoranda serves as a case in point.

The Air Force memorandum is very amenable to mutual use in the proposed area. Under a "hold harmless" agreement, past operations have resulted in a symbiotic relationship, which includes authority to require temporary evacuation of drilling platforms during missile launch periods.²⁷⁹ In practice, a very satisfactory level of cooperation has been established between the Air Force and the companies conducting drilling operations.

In order to accommodate both increased offshore activity and missile activity, the Air Force recommends that an increased level of control over drilling activities is considered to be prudent because the proposed drilling will take place in areas where programmed impacts of first-stage rocket motors and associated panels will occur. In the past, drilling has been conducted in areas where a vehicle now functioning represented the only potential hazard.²⁸⁰

In its judgment, the Air Force finds that mutual use of proposed lease land is feasible and would not hinder its operations or jeopardize "national security".

²⁷⁹ Id.

²⁸⁰ Navy Memorandum, n. 271, at 2.

On the other hand, the Navy Department did not approve of mutual use for the majority of proposed OCS sites on the grounds that it is not compatible with multiple military operations. (It should be noted that much of the same area is used by both the Air Force and the Navy Department.)

In its memorandum, the Navy Department recommends millions of acres to be excluded from any offshore drilling.

The two reasons given for exclusion are "national security" and cost. The Navy Department designated some areas for mutual use (which the Department of Interior recommended for leasing) if oil rigs and other permanent structures were spaced no more than 1 every 10 nautical miles. (This is due²⁸¹ to "the extent and nature of military operations . . .") In addition, a few limited areas were classified as free use.

Military operations in excluded areas include principally Project Caesar, the Pacific Missile Range, special use fleet operating areas, a safety area surrounding San Clemente Island, and the submarine transit lanes. According to the memorandum, Project Caesar qualifies for an exclusion classification because there is "no alternate site available. Site location is²⁸² critical to the security of the United States."

281 Id. at 4.

282 Id.

The Pacific Missile Range (P.M.R.) is situated off the Southern California coast. The P.M.R. through its instrumentation and geographical configuration, provides an area in which fleet and R.D.T.E. programs involving live ordnance and missile firing may be carried out under conditions which allow highly accurate control and data acquisition. There is no area contiguous to the United States, other than P.M.R., in which this range could conceivably be located. Moving the P.M.R. westerly of the San Miguel-San Nicolas access will result in cost and time delay, while data accuracy will deteriorate markedly and operational problems will be compounded.²⁸³ Cost of relocating range capabilities to the outer island is approximately 88.5 million dollars with additional annual costs of 6.7 million dollars. Cost of relocating P.M.R. to stable ocean platforms in lieu of outer island development is 329 million dollars with additional annual costs of 7.3 million dollars. Use of either the outer islands or stable ocean platforms will require the extended area tracking system. Acquisition costs of this system will amount to 57 million dollars. Four to five years will be required to accomplish such moves.²⁸⁴

Fleet Operating Areas are located near and around the San Clemente Island which is also part of the exclusion recommendation. These areas are special use areas heavily scheduled for fleet training exercises. This is the only area

283 Id.

284 Id.

on the west coast utilized for shore bombardment exercises and there are no known alternate sites available. Continued aircraft carrier operations including air to air, air to surface, and surface to air missile and gunnery exercises are conducted in these areas.²⁸⁵

In addition, submarine transit lanes are excluded from O.C.S. development. Transit lanes are required for safe undetected submerged transits to and from San Diego. The requirement for undetected submerged transits are vital to the "security of the United States". These lanes are also utilized by surface vessels for safe transit to and from operating areas. It is desirable to maintain at least a 2 mile wide buffer zone clear of underwater obstructions on each side of these transit lanes.

In each military operation the Navy Department asserts that each is vital to "the security of the United States" and thus qualifies the areas for exclusion. We do not take issue with the Navy Department's contention that Project Caesar and the Pacific Missile Range are important military operations. We have no basis for evaluating that claim. The exclusion of millions of acres from potential lease sites under a claim of "national defense" is difficult to understand, however, when the Air Force claims that mutual use is possible.

²⁸⁵ Id. at 5.

Past experience has indicated that national security has not always been the primary motivation. For instance, the Navy Department could establish some credibility by demonstrating to the Interior Department its need for exclusive use of the suggested areas. The Navy's assertion that its missile areas cannot permit mutual use when the Air Force states that conditional drilling operations are compatible with missile activity.

In addition, designation of fleet operation areas used for training as an excluded area does not seem reasonable. Unless the Navy shows that extensive traffic would preclude any possible or practical conditional drilling, then the Department of Interior should reconsider its present designation and classify such land for mutual use.

Energy independence coupled with prudent and rational use of limited fossil fuels is a primary concern that affects all levels of American society. It, too, can be characterized as a key element of national security. We suggest, then, that a review be made of definitions of national security in order to challenge the Interior Department's unilateral authority to exclude areas without further inquiry into substantive rationale.

The Southern California Council believes that, the public should be allowed to contribute input into the Department of Interior's decision to exclude or propose certain lands for O.C.S. development. Under the present system, the Interior Department sets forth initial calls which delineate possible areas of consideration. Industrial and military interests are allowed to submit their requests. There appears to be no rational reason

for prohibiting public participation. Channels for meaningful communications should be established to open up the decision-making process.

Once the Interior Department has arrived at a decision, its findings should be published in the Federal Register. The Interior Department must indicate, in a detailed statement, the rationale which led to its conclusion.

VI. EVIDENCE THAT THE DETERMINATION HAS BEEN MADE
AND PROCEDURES RESULTING IN A PREDISPOSITION TO DRILL

A recent statement by Secretary of the Interior, Rogers C. B. Morton, published in the Los Angeles Times on January 8, 1975, contains these assertions regarding the proposed O.C.S. development:

Some critics have suggested that new leases should be delayed until coastal states can complete detailed plans for accommodating such onshore developments. I do not believe such delay is necessary or wise . . .

We must move ahead with new offshore exploration as soon as possible -- if only to determine the full extent of these resources. We cannot afford to wait for action by the states, which have only just begun to establish mechanisms for coastal zone planning. And it is not necessary to wait, because no onshore effect will be felt until several years after a lease sale. Moreover, state and local governments can hardly do any detailed planning for onshore impact -- until the exact locations of oil and gas reserves are determined by actual exploratory drilling . . .
Let's get on with the job, together. (Emphasis added)²⁸⁶

The statement above seems to indicate that the Secretary of the Interior has made a definite decision to drill on the O.C.S. Such a predetermination of this essential national decision contravenes the participatory intent of these present hearings.

Monte Canfield, an Energy Specialist with the General Accounting Office who was formerly Deputy Director of the Ford Foundation Energy Policy Project, made the following comments at the hearing:

²⁸⁶ Rogers Morton; Offshore Oil is the Answer, Los Angeles Times (Jan. 8, 1975).

The problem is the country is caught in an appetite, a self-fulfilling syndrome we get into. If we tighten belts and conserve energy, we open options up. We may decide in the 80's or sometime to open the Outer Continental Shelf. Perhaps by then, we will have the technology and systems that people will be compatible with. (at 236 of the Official Transcript.)²⁸⁷

The Secretary of the Interior apparently has disregarded such cautionary expressions from not only Mr. Canfield but also from economists, scientists, politicians, and public interest groups who oppose precipitous development of the O.C.S. This pre-termination to drill is evidenced not only in the Secretary of the Interior's recent statement but also throughout the materials of private and public consulting firms who have furnished information to the Department of the Interior, and it appears to be implicit in the formulation of the draft E.I.S. Such evidence tends to support the notion that the Executive Branch of the federal government has decided to solve the alleged energy crisis and accomplish the goals of Project Independence through the easiest available method - which appears to be accelerated leasing of the O.C.S.

All viable discussion about whether or not O.C.S. development is either efficient or efficacious appears to have ended within the White House and the Department of the Interior. The recent House of Representatives Report concludes that ample reasons exist for continuation of debate and analysis:

287

National Ocean Policy Study, supra n. 227, at 48.

Research revealed that the leasing of approximately 10 million acres of the O.C.S. was not justified under either a medium development program or an accelerated program. The present level of O.C.S. production could be markedly increased from the exploitation of shut-in wells on existing leases.

The overall conclusion is that given U.S. energy requirements between now and 1985 and the various ways in which these requirements can be met, the accelerated leasing program is unnecessary.

(Emphasis added) 288

Yet these reasons do not appear to have had any impact on the predetermination to develop the O.C.S.

Not only does the Department of the Interior appear to be unaffected by such evidence as that contained in the Banking Report, but it also manifests continuing disregard of any dissent through a process of ad hoc decisionmaking based on the predetermination or simply as a matter of routine. There no longer appears to be any agency confusion over whether the O.C.S. development will occur. The relevant agencies consider drilling a fait accompli. The following analysis is undertaken to reveal the existence of and reasons for this predetermination and the possible adverse economic and environmental effects which may result from that decision.

We proceed here on the assumption that "orderly development" is preferable to "ad hoc development". Orderly development is particularly difficult in the O.C.S. matter for many reasons,

288

Banking and Currency Committee Report, supra, n. 230, at 1.

some of which are articulated in the following statement of Joseph Bodowitz, Executive Director of the California Coastal Zone Conservation Commission:

. . . the thing that makes planning in regard to the Outer Continental Shelf oil so difficult is it is impossible to understand what the full ramifications are on the basis of anything we have received from the Interior Department . . . it seems to me no one can plan adequately and no one can know what the proper litigation measures are or even if the drilling should take place until you know how, where, when, and what the safety procedures would be and what kind of provisions would be made if there were an oil spill and there is great concern about the recreational and other uses of beaches and perhaps as important as everything, where does the oil go? What are the pipelines? What is the impact on the land? How many refineries and where? . . . It is just the uncertainty that makes this so exceedingly difficult to deal with. 289

Because information about the proposed development is difficult to organize in an orderly manner does not mean that the federal government should simply abandon the attempt. That difficulty by itself suggests that the federal government should attempt to combine as many of the constituent factors as possible into a rational analysis in order to minimize the difficulty of reaching a decision on whether to drill. Once having arrived at the decision to drill, consideration must then be given to the methods by which the federal government hopes to effectuate the decision. Thus, assuming that the goal of O.C.S. development is perceived as effective implementation of Project Independence Blueprint, the analysis does not leap directly to "How fast can we develop the O.C.S.?" but, rather, to an intermediate step of

289

National Ocean Policy Study, supra n. 227 at 42.

"How can we efficiently, equitably, and safely, develop the O.C.S. in an environmentally sound manner?" The latter procedure would be consistent with the statement of the Department of the Interior goals for the draft E.I.S. which are:

1. Orderly resource development.
2. Protection of the environment.
3. Receipt of fair market value. 290

A. Is the Department of the Interior Reluctant to Await a Comprehensive Federal Energy Policy Statement?

There is general agreement among the political, business, and social communities that the most imperative issue at the moment regarding the national energy crisis is the formulation of an efficient and equitable national federal energy policy. Such a federal policy should, of course, contain both guidelines for future agency actions concerning implementation of the factors which were considered and which form the rational basis for the policy.

Some elements of the business community appear to reveal a strong reluctance to wait for such a federal policy, as in the following statement by the Offshore Oil Drilling Task Force of the Los Angeles area Chamber of Commerce:

Statement #16: Offshore drilling should not be initiated until there is a national energy policy.
Comment: No national energy policy has been conceived within the past fifty years and none is likely, for political reasons, in the next few years when policy decisions must be made to meet future energy requirements. (Emphasis added) 291

290

Id. at 42.

291

Offshore Oil Drilling Task Force (1974).

The unlikelihood of an articulated national energy policy is based on the assumption that, because no such policy has ever existed, because the problems are so complicated, and because there are many political interests concerned, there never will be such a policy. The danger of such an attitude lies primarily in the results which it is used to justify. Thus, some argue that, because the energy crisis is a present danger and because there is no federal policy nor will there ever be, we must simply steam-roll ahead on a pragmatic basis. Yet we must not focus on the enormity of the domestic energy shortage and on the specter of foreign oil intrigue simply to avoid serious consideration of the difficult issues concerning the total impact of O.C.S. development.

B. Have the Department of the Interior Officials
Manifested an Attitude of Predetermination?

It was suggested at the Ocean Policy Study hearings at Santa Monica, California, September 1974, that the public was beginning to doubt the credibility of federal officials in the O.C.S. debate. This attitude was expressed as follows:

"Actions subsequent to control of the first blowouts and the on-again/off-again drilling moratorium and the close-following second blowout, further eroded confidence in the Department of the Interior to the point that some even accused the government officials of bad faith, malfeasance, and benign neglect."
(Emphasis added)292

There has also developed a growing awareness that federal officials are proceeding in total disregard of the facts involving prior oil blowouts and assuming the inevitability of the intent to lease on the O.C.S. The possibility of a predetermined decision by the Department of the Interior was expressed as follows:

(the) announcement of the call for tract nominations on 1.6 million acres of O.C.S. offshore of Southern California, by the Bureau of Land Management (BLM) of January 2, 1974, came within five years after the Santa Barbara Blowout. According to many public witnesses and local officials who testified at the Ocean Policy Study hearings at Santa Monica, California, September 27 and 28, 1974, the most recent Interior Department announcement came without forewarning. However, there is evidence that a tentative outer continental shelf leasing schedule existed as an internal document within BLM in July, 1973. (See Exhibit B, complaint filed in U.S. District Court, Central District of California, August 5, 1974, California v Morton, CIV 74-2374-AAH)²⁹³

C. Has the Oil Industry Exercised Undue Influence
on the Department of the Interior?

Substantial evidence suggests that the business community has exercised a persuasive influence on decisions made by federal government officials about O.C.S. To avoid any "anti-business" responses to our claim of undue influence, we intend to provide specific instances of such influence.

293

National Ocean Policy Study, supra n. 227, at 14-15.

Our specific concerns regarding the oil companies include: (1) the failure to report to relevant federal officials the possible lack of industrial personnel and materials to appropriately develop the O.C.S. at the present time; (2) oil industry generation and control of the data upon which federal officials base their decisions; and (3) the impression that the oil industry may exercise undue influence over its regulatory agency.

1. Is There Evidence That the Oil Industry Has Inadequate Personnel and Materials?

A recent comprehensive report on the accelerated²⁹⁴ development of the O.C.S., prepared by the House Banking and Currency Committee, explores the possible lack of oil industry capability to effectively and efficiently develop the O.C.S. at the present time. Chapter 2, entitled "Materials and Equipment Under an Accelerated Outer Continental Shelf Leasing Program", specifically focuses on present problems with industry technology and sources of supply. The serious concern of these researchers is expressed as follows:

A central question concerning the wisdom of accelerated development is whether the oil industry has the ability to keep production abreast with the anticipated increased domestic supply of crude oil. An essential component of this production capability is

²⁹⁴
Id. at 14.

the supply of equipment and materials needed to mine off-shore oil. The study finds that there are projected shortages in steel and steel products, rotary drilling rigs, mobile drilling platforms, and fixed drilling platforms.*

We must emphasize that this comprehensive and authoritative report exists and is available for consideration by the Department of the Interior. Our analysis here will highlight the most important factors set forth in that report that suggest insufficient industry capability to develop the O.C.S.

There is a shortage of available steel. There is a²⁹⁵ shortage of skilled labor to operate the drilling platforms. Many oil refineries are not able to operate at total productive capacity because there is no uniform construction program for²⁹⁶ oil refineries. Current refinery expansion, and construction of new refinery capacity, are not progressing fast enough to keep pace with the growth in demand for oil products.²⁹⁷ There continue to be substantial problems surrounding the construction of pipelines and the development of deepwater port facilities.²⁹⁸

*

Banking and Currency Committee Report, supra, n. 230 at 2.

²⁹⁵ Id. at 1-2.

²⁹⁶ Id. at 11.

²⁹⁷ Id. at 14.

²⁹⁸ Id. at 17.

The factors above are but a few of those which in a cumulative grouping led the researchers in the staff of the Banking and Currency Committee to conclude that:

In light of this situation, the Interior Department's proposed acceleration of the Outer Continental Shelf Leasing schedule, which calls for the lease sale of 10 million acres in 1975, must be criticized. While the intention of this policy to use the crude oil produced from the OCS as a supply base for domestic refineries, and thus reduce the amount of crude oil imported from foreign sources, is basically sound, potential problems may arise, such as what happens if the oil discovered on the OCS is of a quality and grade that cannot be processed at domestic refineries without substantial adjustments being made to distillations units. It is our opinion that further consideration and examination of this proposed policy of accelerated OCS leasing is warranted. (Emphasis added)²⁹⁹

We have set forth in a general way the factors which suggest a lack of industry capability to develop the O.C.S. in order to focus sharply upon the fact that the oil industry has not manifested a good faith attempt to fully inform the Department of the Interior of these technological inadequacies or the Department of the Interior, if such information was available, has not manifested a serious consideration of these matters in the E.I.S..

2. What is The Effect of Department of the Interior Reliance Upon Industry Accumulated Data? What is the Effect of the Proprietary Privilege Attached to Some of These Findings?

Concern has often been expressed over whether the oil

industries were in a superior bargaining position because of their generation and control over dissemination of oil development data. California State Controller Kenneth Cory expressed his concern as follows:

The history of Outer Continental Shelf leasing indicates that the process of selecting the areas to be explored and leased has been left to the discretion of the industry . . . For one thing, we must note in passing that the companies involved have more than a little opportunity to use inside information and contact in getting those areas put up for lease on which they can then bid to best advantage . . . But, even more important, it means that the buyers in a government sale have far more information than the seller, as to the value of the item sold. (Emphasis added) (Official Transcript at 68) ³⁰⁰

The oil industry's control over the data used for the Department of Interior decisions is secured by their claim of proprietary information which avoids its public disclosure. The Freedom of Information Act, 5 U.S.C. 552, exempts trade secrets and geological and geophysical information and data. Accordingly, in terms of pre-site data, the government receives only what the industry desires to give it and even this "will remain confidential on request". (39 Fed. Reg. 6541.) The fact that the Department of Interior is contracting to spend 6 million dollars of public money for geologic seismic data does not detract from its proprietary nature. (See Fed. Reg. for Jan. 31, 1974.)

The Department of the Interior, realizing the problems that arise from non-disclosure of many material facts, proposed rule changes concerning submission and disclosure of O.C.S. geological and geophysical data in the Federal

Register on May 16, 1974. (39 Fed. Reg. 17446) The Department of the Interior states:

. . . that the submission of such data to the Geological Survey and the disclosure of such information to the public will serve the public interest, conserve natural resources, encourage competitive bidding, and assure the receipt of a fair market value for federal resources. (39 Fed. Reg. 17446) (Emphasis added)

As might be expected, these changes were met with massive resistance from industry at a public hearing conducted on July 15, 1974. The oil industry claimed that such disclosure would be (1) a confiscation of proprietary rights, (2) exceed the limits of O.C.S. Lands Act, (3) simply add one more confused estimate, and (4) choke off technological innovation and competition. The Western Oil and Gas Association supported these self-protective arguments with the assertion that full disclosure would, in fact, be "unAmerican" because "if available to all, there would be no incentive to pay for doing the work in the first place."

From a rational standpoint, it should be apparent that the primary question is not whether research companies will be paid but rather what methods insure the fullest use of material information gathered by such companies. Of course, someone will have to pay for data gathering. It may be private industry or it may be the government who pays. Once paid, however, the company should have no further interest in the dissemination of this information so long as there is no abridgment of any relevant copyright problems.

W.O.G.A.'s position leads to the conclusion that private

companies which gather such data want payments from anyone who uses the information. Yet to accept that argument is to assume that undue enrichment to these companies would result. These companies, however, presumably calculate the fair cost of information gathering at the time they enter into the contract with the original purchaser. In terms of equity, once there has been fair payment, then these companies should have no right to continuing secrecy unless there is a specific legally-recognized infringement such as a trade secret.

The information that we are concerned about should not be secret, for it describes a national resource. As general information regarding geological and geophysical data, it is not a carefully-guarded formula. The Council on Environmental Quality Report discusses proprietary data as follows:

. . . it is not clear that the release of processed seismic reflection data would substantially jeopardize the competitive positions of the oil companies in relation to the government or to each other, because they recitatively share group-shoot data with the government and among themselves. Moreover, because competition dissipates after a lease sale, the justification for continuing to withhold exploratory data after lease awards is unclear. (at 9-16)

What, then, is the effect that such private industry attitudes about proprietary data have upon the decisionmaking function of federal officials. Officials of the Department of the Interior have a very difficult task to remain totally immune and neutral to industry claims for nondisclosure. Yet a neutral attitude is precisely what the public expects from governmental officials. The public suffers from lack of information and lack of industry participation. The Council on Environmental Quality

report summarizes these latter inequities as follows:

The fact that the Interior Department treats industry data as proprietary 'severely restricts the effectiveness of the public review process,' particularly in commenting on environmental impact statements. Although there may well be sound reasons for withholding some data in some circumstances, the competitive justification for a blanket prohibition of public disclosure is not clear. (at 9-16)

3. Do the Oil Companies Exercise Undue Influence on the Department of the Interior's Decisionmaking Process in Regard to O.C.S. Development?

Concern has often been expressed about the problems inherent in the creation of a regulatory governmental agency whose purpose was to effectively regulate strong power blocs such as the oil industry. That concern is heightened by growing public suspicion that many regulatory agencies appear to be unduly influenced by those they seek to regulate either by direct or indirect methods. Such awareness is typified by one political theorist as follows:

. . . criticism voiced by Theodore Lowi that the very vagueness of post-1937 Congressional allegations of power was producing 'bargaining on the rule: between regulatory agencies and the supposed object of their regulation, resulting in a governmental inability to achieve a "rule of law" grounded in clear decisions about values.' 301

On October 13, 1974, the Los Angeles Times published an article by Irving Bengelsdorf, Director of Science and Technology

301

Oil Pollution and the Public Interest, A study of the Santa Barbara Oil Spill, at 100. Hereinafter cited as Oil Pollution and the Public Interest.

at California Institute of Technology. Bengelsdorf said that the Secretary of the Interior, Rogers C. B. Morton, appeared at a White House briefing of leaders of the oil industry on August 16, 1973. Morton told these representatives of the oil industry:

I would just like to say . . . that the office of oil and gas is an institution which is designed to be your institution, and to help you in any way it can . . . our mission is to serve you, not to regulate you. We try to avoid it . . . I pledge to you that the department is at your service. 302
(Emphasis added)

We do not intend here to evaluate whether the oil industry exercises undue influence over the Department of the Interior, or its regulatory branch, the U.S.G.S. We raise the issue only as another factor which suggests that O.C.S. development has not been adequately scrutinized and investigated by the appropriate federal officials.

D. Was an Assumption of Predetermination Manifested Throughout Earlier Stages of the Leasing Procedures?

There was a substantial assertion made at least as early as the Santa Monica hearings in September, 1974 that the Department of the Interior was proceeding upon an assumption that drilling will take place. As memorialized in an affidavit from a member of the Attorney General of California's Task Force in these matters:

. . . 4. At the meeting July 11, 1974, [California Resources Agency Conference Room, located at 1416 Ninth Street, Sacramento, California] representatives of various agencies of the State of California

302 People v. Union Oil, CIV 74-2374-AAH.

and the U.S. Department of Interior to discuss potential Outer Continental Shelf (OCS) development off the Southern California Coast], Jared Carter, Deputy Undersecretary of the Department of Interior, made several statements concerning the proposal of the U.S. Department of Interior to engage in the development of oil and gas resources on the Outer Continental Shelf (OCS) off the Southern California coastal area. He stated in substance: (a) that he was sent to California to do a selling job with the citizens of California, convincing them of the feasibility and merits of OCS development, . . . (b) that every conscientious decisionmaker is convinced Outer Continental Shelf Oil and gas development is the way to go. (Emphasis added.) 303

State Assemblyman Alan Sieroty voiced a concern in the California hearings about whether the decision to open the O.C.S. has already been made when he stated:

. . . I think a lot of people are suspicious about government generally these days, and wonder whether the fact that the President of the United States made a statement some time ago about opening up this area for oil drilling means that it's an accomplished fact: that no matter what environmentalists think, no matter what economic, social and other considerations may bring to light that it has already been decided to go ahead. . . . 304
(Emphasis added)

303

Exhibit X. Attorney General's Material. Affidavit of Robert H. O'Brien at 1, People v Union Oil, et al.

304

Exhibit J. Attorney General's Material, People v Union Oil, et al. Assembly Select Committee on Coastal Zone Resources. Apr. 9, 1974, Santa Monica, California Hearing: Offshore Oil Drill at 21. Hereinafter cited as Exhibit J Attorney General's Material.

As well as substantially influencing later actions by federal officials who act as though the issue has already been resolved, the implicit assumption that drilling will take place nullifies the overriding principle of N.E.P.A. that there must be effective public participation in the decisionmaking process. That this principle is firmly imbedded in N.E.P.A. determinations and that federal officials do, at least, recognize it verbally, is evident from the following statement in the National Ocean Policy Study:

. . . Duke Ligon, of F.E.A., referring to the N.E.P.A. process stated: ' . . . (This) procedure is designed to assure the opportunity for all responsible public and private points of view to be expressed. Interested parties are encouraged to involve themselves at appropriate stages in the development of the environmental impact statement'. 305 (Official Transcript at 49.)

Ligon stated further that "a Secretarial decision to lease O.C.S. lands assumes that national, state, and local governments have been involved in the process from the beginning to end." (Official Transcript at 49.) (Emphasis added)

A contradiction exists between what federal officials mistakenly believe to be the case -- that there has been effective public participation and dialogue -- and what is, in fact, the case - that the public is listened to only in a pro forma manner after the decision has already been made.

E. What is the Adverse Effect of an Ad Hoc Decision-making Process?

Is Orderly Planning More Desirable than Expedient

Measures which do not Consider Detrimental Consequences?

The assumption that drilling will take place has also led to the possibly disastrous consequence of providing a basis for a series of ad hoc secondary decisions throughout the appropriate agencies. The theoretical objection to this type of disconnected decisionmaking is that it leads to undue uncertainty and confusion. Theodore J. Lowi, a prominent political scientist, discusses this problem in his book THE END OF LIBERALISM (New York, Norton, 1969) where this analysis is found:

. . . Lowi's emphasis is on partial decisions in the sense of incomplete decisions-on the 'non-cumulativeness' of governing experience when there is bargaining about each decision without a guiding set of rules and cumulative, coherent precedents. 306

Daniel Moynihan also expressed a concern with this issue in his article, "Policy vs. Program in the '70's", in the Public Interest, No. 20: 90-100 (Summer 1970) where he argues for the substitution of coherent planning instead of ad hoc "program-making".

One method of such ad hoc decisionmaking is to simply avoid the problem by recategorizing some debatable issue. This was seemingly evidenced in the Department of the Interior's attitude to public criticism of the facts surrounding the "call for nominations".

306 Oil Pollution and the Public Interest, supra n. 301, at 152.

. . . the Department of the Interior uses a highly technical approach to interpret and administer the regulations promulgated under the Outer Continental Shelf Lands Act. One example is the determination that the 'call for nominations is not a decision', that a 'decision' is not made until it is decided which tracts are to be sold. While perhaps technically defensible, the non-federal witnesses did not consider the distinction as a reason not to freely consult state and local representatives prior to the call for nominations. 307 (Emphasis added)

Some physical proof of ad hoc decisionmaking at higher executive levels may be inferred from the fact that after President Nixon announced a plan for expanding O.C.S. development, the personnel in the B.L.M. in Los Angeles subsequently increased.

This fact was discussed as follows at Santa Monica:

Mr. Douglas: When your staffing was increased, was that before or after President Nixon's announced plan for expanding these OCS activities.

Mr. Grant: The office wasn't opened until after that announcement. It was opened in September . . . 308

The office was clearly opened to administer a program of regional O.C.S. leasing.

307

National Ocean Policy Study, supra n. 227, at 3-4

308

Exhibit J. Attorney General's Material, supra n. 304, at 28.

F. What Other Considerations Create Inferences That a Predetermination Has Been Made?

Have there been Previous Appropriations Without an E.I.S.?

Is There a Financial Advantage to the Department of the Interior in Maintaining the Status Quo?

Has there been Consideration of the Irreversibility of Oil Development?

The California Attorney General, in the case of Californiav. Morton, argued that N.E.P.A. had been violated by the Department of Interior's actions which were taken without an E.I.S. We agree. Specifically, the 1973 five-year leasing program, and the initiation of Lease Sale No. 35 off the Southern California coast, do not meet the requirements of N.E.P.A. The Department of the Interior contends that the decisions inherent in these previous actions were not decisions for the purposes of N.E.P.A.

Yet, the language of N.E.P.A. itself provides the surest measure of Congressional intent. While there is no direct mention of impact statements or regulations, long-range plans, or policy statements, Section 102(c) statements are required for "every recommendation or report on proposals for legislation." The words "other major federal actions" should be read to include a program with the breadth and potential impact of O.C.S. leasing.

Numerous federal courts have found it necessary for federal agencies to provide environmental impact statements in situations where the relevant federal agencies felt that such a

statement was not necessary. The case Scientists' Inst. for Public Info., Inc. v Atomic Energy Commission (AEC), 481 F. 2d 1079 (D.C. Cir. 1973) includes a statement of the court to the effect that whenever there exists a federal agency program of some magnitude and that program falls within the confines of N.E.P.A., the federal agency sponsoring that program must prepare a detailed statement thereon. This "program" statement should not be concerned with the specific environmental issues of a particular facility or a particular tract or a particular phase of the program, but must be concerned with "the broader considerations necessarily involved in an impact statement on the overall program." (Scientists Inst. v AEC at 1093.) The same principle applies to the situation before us.

When it appears that the Department of Interior has made an accurate interpretation as to the policies of N.E.P.A., courts will compel the relevant agency to meet the requirements of N.E.P.A. if the court finds that those requirements have been violated. We suggest that the Department of the Interior should be encouraged to consider more fully the implications of the proposed O.C.S. development.

Finally, we wish to briefly focus upon the fact that oil development involves the exploitation of a finite natural resource which may soon be exhausted. This fact means that such development will be irreversible. The Department of the Interior, in manifesting an attitude that suggests that the decision to develop such land has already been made and that there will be no viable discussion about the proposed action, leads to the conclusion that

the Department of the Interior is either unaware of the irreversibility of its decision or disregards the importance of the exhaustible characteristic of the national oil resources.

E. Conclusion

We believe that a predetermination of these issues has been made and has resulted in a predisposition to drill. Public participation in the decisionmaking process concerning the utilization of valuable national resources has therefore been rendered ineffectual. We believe that effective policy-making by the Department of the Interior requires the substitution of a rational process instead of ad hoc decisionmaking, particularly in view of the fact that O.C.S. leasing is an integral part of the implementation of a national energy policy. The Department of the Interior should proceed to accumulate the necessary scientific and technical data to formulate knowledgeable answers for questions involving the implementation of O.C.S. development as well as the larger social concerns about protection from adverse effects on our social, economic and environmental welfare. Because such data does not appear to have been assembled or seriously sought out by the Department of the Interior, the B.L.M. has not had the opportunity to work from a sufficient scientific data base. There is now available sufficient scientific, political, economical, sociological and environmental information. The Department of the Interior officials must compile such material and reconsider its commitment to O.C.S. leasing.

VII. THE COASTAL ZONE MANAGEMENT ACT

We believe that for the Department of the Interior to proceed with O.C.S. leasing in the manner and within the time limits that are now proposed would result in circumventing the purposes of the 1972 Coastal Zone Management Act. We strongly urge that leasing of coastal waters be postponed until the affected states have a reasonable opportunity to adopt coastal management plans. (We note in this regard that the efforts of the states to develop management plans have been hampered by a lack of funds. Although Congress directed that grants should be made to states for preparation of plans, a substantial portion of those funds which were to be allotted were impounded by former President Nixon.)

In passing the Coastal Zone Management Act, Congress found that:

The increasing and competing demands upon the lands and waters of our coastal zone occasioned by population growth and economic development, including . . . extraction of mineral resources and fossil fuels. . . have resulted in the loss of living marine resources, wildlife, nutrient rich areas, permanent and adverse changes to ecological systems, decreasing open space for public use, and shoreline erosion. . . . (451 subsection c.)

Congress also found that "important ecological, cultural, historic and aesthetic values in the coastal zone which are essential to the well-being of all citizens are being irretrievably damaged or lost (Section 1451 (e)), (emphasis added), and that:

Special natural and scenic characteristics are being damaged by ill-planned development that threaten these values. (Section 1451 (f))

The key to more effective protection and use of land and water resources of the coastal zone is to encourage the states to exercise their full authority over the lands and waters in the coastal zone by assisting the states, in cooperation with federal and local government and other vitally affected interests, in developing land and water use programs for the coastal zone, including unified policy, criteria, standards, methods, and processes for dealing with land and water use decisions of more than local significance. (Section 1451 (h))

Moreover, Congress has declared that it is the national policy "for all federal agencies engaged in programs affecting the coastal zone to cooperate and participate with state and local government and regional agencies in effectuating the purposes of this title" (Coastal Zone and Management Act , Section 1452 (c)).

Pursuant to the California Coastal Zone Conservation Act of 1972 (California Public Resources Code Section 27000 seq-), the California Coastal Commission is in the process of adopting a coastal zone management plan. In terms of the potential impact of O.C.S. development, the most important portion of that plan is the energy element. Action was taken on January 26 to approve the proposed energy element.

In order to meet the requirements of the Coastal Zone Management Act, this plan must include:

A definition of what shall constitute permissible land and water uses within the coastal zone which will have a direct and significant impact on the coastal waters. . . . (Section 1454 (b)(2))

The plan adopted by the State Commission will be submitted to the State Legislature and then, if approved by the State Legislature, submitted to the Secretary of Commerce for his approval. After the Secretary of Commerce approves a state plan, the Coastal Zone Management Act provides that:

Each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs. (Section 1456 (c) (1)) Any federal agency which shall undertake any development projects in the coastal zone of the state shall insure that the project is, to the maximum extent practicable, consistent with approved state management programs. (Section 1456 (c) (2))

In view of the fact that California's energy element of the coastal plan is pending, and since California has made every effort to provide for prompt adoption of the coastal plan, it would seem unreasonable and unfair for the Department of the Interior to proceed with the proposal in a precipitous manner which may endanger the implementation of a state's carefully drafted plan.

The need for coordination is made apparent by several conflicts which exist between the proposed O.C.S. development and the policies regarding petroleum exploration and production adopted by the Coastal Commission on January 26. The overriding policy adopted by the Commission was that the need for offshore oil development should first be clearly determined:

Because of the risk of oil spills, the adverse visual impact of oil platforms, and the need for related onshore facilities that would necessarily accompany development of the Outer Continental Shelf (O.C.S.), new offshore oil and gas development of state or federal lands, shall be permitted only after:

- a. A comprehensive analysis has determined the need for California offshore production in light of the anticipated inflow to California . . . of oil and other forms of energy from all other sources, including onshore oil production, Alaskan North Slope oil and gas production, production in other regions of Alaska, foreign oil in gas imports, and in view of California's projected capacities to refine and store the anticipated inflow of oil from sources other than new offshore production; or
- b. Development of the O.C.S. off California has been clearly identified as an integral and priority part of a comprehensive, balanced national energy conservation and development program (Policy 16).

As noted elsewhere, the proposed O.C.S. development is not a part of a comprehensive national energy conservation and development program. Until such time as a comprehensive plan is developed and the role of O.C.S. development in that plan is determined, no major offshore oil production activity should occur.

Another petroleum policy adopted by the Coastal Commission is to allow offshore drilling only where safe (Policy 18):

To minimize the risk of adverse environmental effects resulting from oil discharges, offshore drilling and production shall be permitted only where it can be demonstrated that:

- a. The most advanced state-of-the-art drilling and production technology is utilized.
- b. The geologic characteristics of the area have been adequately investigated and are consistent with safe drilling and production.
- c. The proposed well sites are the least environmentally hazardous and disruptive sites feasible.

No similar policy safeguards guide the proposed O.C.S. development.

Another policy adopted by the Coastal Commission encourages consolidation of drilling, production and processing sites (Policy 19):

To minimize construction in offshore areas and development of related onshore facilities, all petroleum-related development and operations shall be unitized or consolidated . . . to the maximum extent feasible, unless it can be shown that unitization or consolidation will not reduce the number of facilities, or significantly reduce the number of producing wells or support facilities required to produce the reservoir economically and with minimal environmental impacts.

No similar policy exists in the proposed O.C.S. development.

The Coastal Commission also requires the use of submerged completion and production systems where feasible and environmentally safe (Policy 20):

To reduce the visual impacts of offshore operations, subsea completion of wells and submerged production systems shall be used where environmentally safe, as demonstrated through adequate testing of equipment, and where technically and economically feasible. In those areas where all platforms or islands would have a substantial adverse environmental effect, including degradation of aesthetic values, no offshore drilling should be permitted unless and until subsea completions or submerged production systems are demonstrated to be environmentally safe.

No similar policy safeguards control the proposed O.C.S. development.

Another policy of the Coastal Commission is to minimize the impact of onshore facilities (Policy 22):

All onshore drilling, production and onshore support facilities for offshore operations, including separation plants, pipelines, terminals and storage facilities, shall be designed and located to minimize their environmental impacts consistent with recovery of the resource. . . . Where such development would necessarily result in substantial adverse impacts to the resources of the coastal zone, it shall be permitted only upon a demonstration that there is a need for the project. . . ., that alternatives would have a greater adverse environmental impact, and that there is little likelihood of improvement in technology that would substantially reduce such impacts in the immediate future. . . .

No similar policy safeguards guide the proposed O.C.S. development.

The California Coastal Commission also advocates the establishment of an oil spill liability fund (Policy 26):

To encourage the use of the highest state-of-the-art technology in offshore petroleum operations, ensure the effectiveness of oil spill contingency plans, guarantee prompt compensation of damages resulting from oil spills, and in the absence of existing federal legislation adequate to fully achieve those ends, the California Legislature should enact legislation requiring that:

- a. Each approved applicant shall be required to show evidence of secured financial responsibility to the State Lands Commission in the amount of \$10 million for each individual lease prior to the initiation of any offshore drilling.
- b. Each approved applicant shall be required to pay a two cent fee on each

barrel of petroleum produced from a well on State lands, which shall go toward creation and maintenance of an Oil Spill Liability Fund.

The Coastal Commission strongly recommends federal legislation to create a single national oil spill liability fund in order to compensate damages caused by spills from tanker operations and offshore oil exploration and development. The proposed O.C.S. development fails to provide for such a fund.

The Coastal Commission has also adopted a policy providing for protection against any adverse impact of O.C.S. development (Policy 27):

To ensure that production of petroleum from federal areas more than three miles off the California coast has no substantial adverse impact on the California coastal zone, and that federal O.C.S. development and related activities are compatible with goals set forth in this and other elements of the Coastal Plan, the Coastal Commission or the agency designated to carry out the Coastal Plan, the California Legislature, the California congressional delegation, the State Lands Commission, the Division of Oil and Gas, and all other concerned agencies should seek agreement from the Department of the Interior and other federal authorities that no federal O.C.S. leases will be approved by the Department of the Interior unless:

- a. Need for federal O.C.S. development off California has been clearly determined. . . ;
- b. Opportunities for effective review of proposed O.C.S. development plans are provided for the general public, interested units of state, regional, and local government, and other segments of the communities most immediately affected by O.C.S. development activities;
- c. One, five, and ten-year plans for petroleum production and all related

development. . . and their impacts on the California Coast, are fully developed and disclosed;

- d. The leases in question are clearly separated from State petroleum sanctuaries to prevent drainage of oil and gas reservoirs that may lie partially on state submerged lands;
- e. Petroleum production under federal jurisdiction off the California Coast is made subject to safety standards at least as stringent as those for production on state-regulated offshore areas. . . ;
- f. The possibility of unitization or consolidation of all operations and facilities has been fully evaluated. . . ;
- g. The possibility of use of submerged drilling, completion, and production systems that have been adequately tested to meet rigid environmental safety standards has been fully evaluated as a partial alternative to platforms;
- h. The federal government has agreed to provide monies to California (and to other coastal states) either through a fee related to production volumes, or by making available a portion of its revenues from O.C.S. lease sales or production royalties, or by granting funds from some or other source, to assist the state and local governments in planning for and overcoming or mitigating any adverse impact of this production. . . and to assist the state and local governments to purchase land for recreation or provide other amenities along the coast to help offset the impact of O.C.S. development;
- i. Sites and tracts should be designated as sanctuaries if they are unusually

subject to the risk of oil spills due to geological seismic disturbance or if they offer unusual coastal aesthetic assets or if the local economy is particularly dependent upon the production of coastal aesthetic assets. Portions of the Santa Barbara Channel and Santa Monica Bay would appear to be candidates for sanctuary status.

The Draft E.I.S. for the proposed O.C.S. development fails to provide for the protections called for by the Coastal Commission. Indeed, unless and until these concerns of the Coastal Commission are addressed by the Department of the Interior, there exists a substantial risk that effective implementation of the Coastal Zone Management Plan for California and for other coastal states will be rendered impossible. The sharp conflict in the governing policies for O.C.S. development and for coastal zone management indicate the need for a delay in the proposed development in order to ensure the resolution of those conflicts in a manner that protects the California coastline.

Many sources have accused California and other coastal states of being parochial about their concern for protecting their coastal resources. We wish to emphasize that at this point we have not taken a position of unalterable opposition to O.C.S. development. We are now only concerned that too many questions have been left unanswered. It is our strong belief, as is declared in the California Coastal Zone Conservation Act, that the coastal resources belong to all of the people. As Congress stated in the Coastal Zone Management Act,

"There is a national interest in the effective management, beneficial use, protection, and development of the coastal zone. . . ." (Section 1451 (a)) Our interest in sound management of this precious natural resource pertains equally to the sound management of our national petroleum resources. The question at this point, rather than whether our petroleum resources should be developed, is how, where, when? We raise our opposition to the Department of the Interior's current plans for O.C.S. development acting as protector of natural resources on behalf of all of the country. That this is a national resource is eloquently stated in the Coastal Zone Management Act.

A delay in O.C.S. leasing, which would allow California and other coastal states to complete their management plans, would have the secondary benefit of allowing each town to answer the important questions that we have raised in this testimony. It would also provide opportunity for completion of many of the base line studies which are now being prepared. When those studies are completed, we hope the country will have the necessary data to do an insightful analysis of the real environmental, economic and social impact of O.C.S. development.

We, therefore, recommend postponement of O.C.S. development until coastal states have had time to complete their management plans.

VIII

CONCLUSION

This Analysis does not presume to be a comprehensive review of all the problems associated with O.C.S. development. Nor does it pretend to have answers to the many difficult questions raised.

The purpose of the Analysis is primarily to raise questions not addressed, or inadequately treated, by the E.I.S. Based on our Analysis, however, we have arrived at the following conclusions:

1. Any decision in regard to expanded O.C.S. development must be made as an integral part of establishment of a national energy program.
2. Adequate demand projections have not been provided on which to base a decision in regard to expanded O.C.S. development.
3. The need for a comprehensive energy conservation program has been demonstrated, and we must explore reduction of demand as an alternative to expanded O.C.S. development.
4. There are many energy sources which may be economically and environmentally preferable alternatives to O.C.S. development which must be explored.
5. We must explore whether producible wells are shut-in in the Gulf of Mexico which could be produced as an alternative to expanded O.C.S. development. Increased

- secondary and tertiary recovery must also be explored as alternatives to expanded O.C.S. development.
6. Shortages of manpower and materials may prevent O.C.S. development within the proposed time frame. O.C.S. leasing should not be accelerated at a more rapid rate than industry can responsibly develop the lease areas.
 7. We do not have sufficient data regarding our marine and coastal resources, and the potential impact of O.C.S. development on those resources. Studies providing the necessary data should be conducted prior to any decision being made regarding expanded O.C.S. development.
 8. The relative environmental impact of drilling in various O.C.S. areas must be considered prior to any decision regarding expanded O.C.S. development.
 9. The air quality impact and land use impact of expanded O.C.S. development and the growth induced by that development have not been adequately analyzed.
 10. The economic and environmental consequences of O.C.S. development are not fully understood. To better understand the potential impact of O.C.S. development, attention should be given to experiences such as the aftermath of the 1969 Santa Barbara oil spill.
 11. As a result of O.C.S. development, land values may diminish.
 12. The public should be compensated for diminution of property values, loss of marine and recreational

resources resulting from O.C.S. development. Local government should be compensated for the cost of providing services to growth induced by O.C.S. development to the extent it is not offset by increased revenues.

13. Mitigating measures such as drilling farther offshore, more stringent regulation, subsea completion and camouflaging rigs must be considered.
14. The present bonus-royalty leasing system may be anti-competitive and fail to assure that the people receive a fair return for sale of their natural resources. Alternative leasing systems should be examined.
15. For the Department of the Interior to proceed with O.C.S. development prior to completion by impacted states of coastal management plans would result in circumventing the purposes of the 1972 Coastal Zone Management Act.

We urge the Department of the Interior to prepare, circulate, and consider a new draft E.I.S., giving careful attention to the issues raised in this Analysis.

SECTION II

THE SCIENTIFIC ADVISORY COMMITTEE ANALYSIS

SECTION II

Scientific Advisory Committee Reports

Members of the Scientific Advisory Committee

- Dr. Richard Perrine, Chairman
Chairman Department Environmental Science and Engineering, U.C.L.A.
- Dr. David Chapman, Associate Professor, Botany Department, U.C.L.A.
- Dr. Richard Emerson, Professor Economics, U.C.S.D.
- Dr. Richard Eppley, Professor of Biology, Scripps
- Dr. Malcolm Gordon, Professor Biology, U.C.L.A.
- Dr. Lyman Handy, Professor Petroleum Engineering, U.S.C.
- Dr. Tom L. Henyey, Assistant Professor Geophysics, U.S.C.
- Dr. L. R. Kaplan, Professor Geology and Geophysics, U.C.L.A.
- Dr. Robert L. Kovach, Professor Geophysics, Stanford
- Dr. William Leisure, Professor Economics, Cal State University
- Lawrence Leopold, Sea Grant, Marine Advisory, U.S.C.
- Dr. Alan C. Lloyd, Assistant Director, Statewide Air Pollution Research
Center, University of California at Riverside
- Robert Lutz, Sea Grant, Assistant Professor, U.S.C.; Director Institute
of Coastal Law and Management
- Dr. James G. Morin, Assistant Professor Zoology, U.C.L.A.
- Dr. Noel Plutchak, Professor Geophysics, U.S.C.
- Dr. Gerhard Wolter, Professor Physics Department, San Diego State
University

Although not all members of the Scientific Advisory Committee contributed written reports for inclusion in this Analysis, their assistance has proved invaluable in preparation of this document.

ACKNOWLEDGMENT

The material prepared by Robert Lutz and Lawrence Leopold on the impact of O.C.S. development on land use was incorporated into Part III, L of Section I of this Analysis. We wish to express our appreciation to them for sharing with us their knowledge of coastal zone management.

A Critique of the Consideration of Air Quality
Within the Draft Environmental Statement
for the Proposed Increase in Acreage to be Offered
for Oil and Gas Leasing on the Outer Continental Shelf

Richard L. Perrine

January 23, 1975

AB 1949, California State University, San Jose

MS 1950, PhD 1953, Stanford University

Professor of Engineering and Applied Science

Chairman, Environmental Science and Engineering

University of California, Los Angeles

Standard for Evaluation

This draft Programmatic Environmental Statement (DPES) has been reviewed noting that it calls for an approximate tripling of OCS acreage to be leased over that leased in prior years. To do so will require dedication of substantial material, human and economic resources to peripheral activities without which OCS leasing would be fruitless. The review also has been undertaken within this layman's understanding of the spirit of the national Environmental Policy Act -- a full and complete disclosure of fact so that decisions made do not lead by increments to unnecessarily destructive consequences; consequences which we might have chosen to avoid given reasonable warning.

Scope of Concern

The review has been directed primarily toward those consequences which would follow for the Los Angeles Metropolitan Air Quality Control Region. However, to export Southern California problems to another region would not be equitable. Thus implicit in the thinking behind any statement is equal concern for similar problems of other regions.

What Does the DPES Say Regarding Air Quality?

The DPES is both brief and specific regarding air quality. On pages variously numbered 104 and 110 of Volume II statements are made as follows: "In terms of air quality problems along the Pacific Coast Zone the only significant areas are located in Southern California, particularly in the Los Angeles Metropolitan Area. The other areas have minor problems which are not considered to be significant." Additional very brief discussion of air quality impacts is included on pages 260 to 262 (or 266 to 268). This discussion relates to emissions from exhausts

of stationary power units and service vessels, the accidental release of oil and gas from wells which are out of control, and changes due to possible increases in refinery capacity.

To place these statements in perspective, consider that the entire State of California, not just the Los Angeles metropolitan area, has committed itself to tougher automobile emission standards than those used nationwide. This has been done at added cost measured in many tens to hundreds of dollars per vehicle, and with reduced gasoline mileage. Air pollution is a problem recognized by those who live in the San Francisco Bay area and parts of the San Joaquin Valley as well as Los Angeles. Thus statements which convey the impression of a disclaimer are not appropriate. Furthermore, the lack of concern suggested is particularly surprising when with proper design of the OCS development program and facilities, improvements in air quality could result. The handling of this very important problem suggests predisposition toward a final result. It does not suggest careful evaluation seeking an optimal path toward an optimal result within an admittedly complex situation.

Impacts Related to Routine OCS Operations

The Western Oil and Gas Association (WOGA) has moved to preempt the field with its "Environmental Assessment Study: Proposed Sale of Federal Oil and Gas Leases, Southern California Outer Continental Shelf" (October 1974). Appendix 2 uses data and simplified modeling to detail probable air quality impacts on the coastal zone from the engines, etc., used in routine operations. The conclusions appear sound and could be anticipated: routine OCS operations would be well enough spread out and would involve small enough emissions to not adversely effect urban air quality. Perhaps for

this reason the rather casual treatment in the DPES almost appears to be justified.

Impacts Related to Uncontrolled Well Operations

Even the best-engineered petroleum operations occasionally get out of control with release of vastly increased emissions to the atmosphere. (A gas well burning out of control in the San Fernando Valley of Los Angeles as this is written provides an example.) Just as wildfires in foliage-covered urban-adjacent areas can cause severe air pollutant emissions for a period, so could a near-shore OCS spill, fire or similar incident.

This fact is recognized in the DPES. However, the brief, offhand discussion suggests a lack of concern for the possible chains of subsequent events. True, air pollution consequences at the time of an incident may seem minor, but only because even more annoying and equally visible signs of man's failure are present. Thus lack of concern should not exist.

There is a well-developed body of knowledge from an even more environmentally sensitive area transferrable to this situation. WASH-1400, entitled "Reactor Safety Study, An Assessment of Accident Risks in U.S. Commercial Nuclear Power Plants," (U.S. AEC, August 1974), provides a summary of the well-developed techniques by which to analyze the possible event trees following some initial equipment or personnel failure. Furthermore, aerospace large-system management procedures can be utilized to avoid mishaps within OCS operations ("Applicability of NASA Contract Quality Management and Failure Mode Effect Analysis Procedures to the USGS Outer Continental Shelf Oil and Gas Lease Management Program," USGS, November 1971). Unfortunately, the DPES shows little evidence that this available knowledge

has trickled down to working levels where "policy" actually is carried out.

It is most unfortunate even at this state of decision-making to read statements such as "there is no reliable way to predict in advance the relative volumes of each of these possible emissions" These words should be replaced at least with references to well-established and appropriate kinds of analysis. The planning process then can in part include establishing priorities for lease areas on the basis of minimum risk.

Impact of Refinery Expansion

It is admittedly not possible to project what Southern California refinery expansion may or may not accompany OCS oil development. There are too many alternative ways to provide the capacity needed. Estimates of Southern California production range to 1,000,000 barrels per day (WOGA "Environmental Assessment"). A likely sustained level if the resource proves out might be 700,000 barrels per day. Estimates are that natural gas at a gas-oil ratio near 2,000 cubic feet per barrel will accompany this oil, totalling perhaps 1,300,000,000 cubic feet per day. In addition, one should consider during the same time frame up to 300,000 barrels per day of oil from Elk Hills, gradually declining production from the rest of California, and up to 2,000,000 from Alaska. Gas production will accompany each source. Even if refinery locations cannot be specified at this time, several consequences are certain. Either this large quantity of oil will be refined at one of a very few locations on the Pacific Coast, it will be pipelined to the east, or it will be sold on world markets. The decision on refinery expansion is a critical one. It is highly undesirable to leave this in a nebulous state because a wrong decision

could have important consequences.

The 1970 crude capacity of Los Angeles refineries was about 918,000 barrels per stream day (Oil and Gas Journal, April 1970). The 1972 emissions from these refineries were credited in tons per day about as follows: particulates, 3; SO_2 , 60; NO_x , 67.5; reactive hydrocarbons, 7.0; and CO 2.0. (Information gathered from local APCD's, the California Air Resources Board and the EPA.) But some of these data currently are recognized as an underestimate of emissions from refinery sources. Under Air Resources Board sponsorship, KVB Engineering, Inc., has tested refinery units and found NO_x emissions to be as much as twice the Los Angeles APCD reference values, for example. (A copy of the newly released report on this work is still in transit to us, so I am unable to give a precise reference at this time. Results have been discussed by telephone only.) Probably estimates of emissions should be 100 tons per day of NO_x from boilers and other heating units within refineries. This is an important quantity of a noxious pollutant which should and can be reduced. Furthermore, SO_x and sulfate emissions may pose a much greater risk than NO_x .

The air quality problem in Southern California is serious. Furthermore, the location of refineries within the air basin is such as to have an important air pollution impact. Thus on the basis of present projections, probably no additional refining capacity should be permitted in the Los Angeles Air Quality Control Region. Before any change from such a prohibition is considered, detailed emissions inventories should be established for the projected configurations. Analysis and tracer studies should establish that the projected expansion will not prevent meeting all federal and state laws, and a monitoring system to ensure compliance should

be established. At least the need for such thorough evaluation should be noted at preparation of the DPES. If such plans are not laid prior to accelerated leasing, convenient development of oil and conventional internal costs are likely to control all siting efforts.

A quantitative measure of the value of siting any refinery expansion outside critical air quality regions can be shown as follows. Suppose Los Angeles' refineries approximately double capacity to meet "demand." Even with improved refinery NO_x control, emissions will increase by about 70 tons per day. To achieve an equal reduction from another large source, the automobile, would require meeting about a 0.4 gram per mile tougher NO_x emissions standard than otherwise planned (vehicle miles travelled estimates based on "State of California Transportation Control Plan for the Metropolitan Los Angeles Instate Air Quality Control Region" November 1974.) While this can be done, it probably would cost an additional 10 to 15% drop in gas mileage. Thus control at the refinery source, including proper siting, is much preferred.

Impact of Natural Gas Availability

There is one strongly beneficial air quality impact of particular importance to Southern California. Natural gas produced along with oil is a clean fuel in very short supply. The quantities under consideration range up to 1.3×10^9 cubic feet per day or about 1.3×10^{12} Btu per day heating value. This closely approaches 1972-73 utility boiler needs. If available, it would permit perhaps a reduction of 105 tons per day in NO_x emissions, and substantial decreases in SO_x emissions and sulfates as well. But to utilize this valuable and non-renewable resource in the best way requires advance planning rather than just sale at some currently highest price. This should be recognized at the earliest possible stage of decision-making, the DPES.

ADDITIONAL COMMENTS ON THE DRAFT E.I.S.

AS IT RELATES TO AIR QUALITY

By

Dr. Alan C. Lloyd

Statewide Air Pollution Research Center,
University of California at Riverside

Additional Comments on the Draft Environmental Statement - Proposed Increase in Acreage to be Offered for Oil and Gas Leasing on the Outer Continental Shelf by the Statewide Air Pollution Research Center, University of California, Riverside

We reinforce the pertinent comments presented by Dr. Richard Perrine. In particular, we feel that not sufficient attention has been given to the possible impact on air quality of any increased oil refining load which may result from the increased oil production. This is not adequately addressed in the Draft Environmental Statement (DES) and subsequent comments are based on the ramifications of any significant increased air pollutant burden in the Los Angeles basin.

Because of the location of exploration and oil refining operation - at the western end of the Los Angeles basin - any increased air pollutant emissions will affect the downwind areas, not only in Los Angeles County, but also the South Coast Air Basin (SCAB) which extends to Riverside and San Bernardino. The DES does not address itself to the possible implications for these downwind areas.

At least three major pollutant categories have to be considered in connection with the DES - hydrocarbons, nitrogen oxides and sulfur oxides. Hydrocarbons, along with nitrogen oxides, are the main precursors to photochemical oxidant production. Because the SCAB is already plagued by oxidant levels which exceed the federal air quality standard for a large majority of the time, during the spring, summer and fall, any major increase in hydrocarbons is clearly unacceptable.

The recent report prepared by KVB Company (September, 1974) for the California Air Resources Board shows that the nitrogen oxides (NO_x) emissions from oil refineries in the coastal areas of the SCAB are already substantially underestimated and that the petroleum industry is the second largest stationary source emitter of NO_x in the SCAB. As indicated above, not only is NO_x a precursor to photochemical oxidant formation, but it contributes to nitrate formation which has

been shown to be a major contributor to visibility reduction, particularly in the eastern area of the SCAB. In addition, many nitrogenous compounds, such as peroxyacetyl nitrate (PAN) are powerful phytotoxicants.

Finally, with the continuing energy crisis and with the likelihood of increased use of high sulfur fuels, any significant increase in emissions of sulfur oxides (SO_x) could have major adverse effects on the health and welfare of the residents of the SCAB when these emissions are added to the existing oxidant burden. Increased SO_x emissions further compounds the problem brought out in the recent disclosure that catalyst equipped automobiles emit significant amounts of sulfuric acid mist which may be a threat to health.

In summary, the impact on air quality in the areas delineated above, resulting from any proposed actions, should be clearly delineated in the DES. This is not the case currently. Parenthetically, emphasis in this or any other project should be one of creating a clean operation--not one of "exporting" the problem to some other areas. If we're going to use petroleum products we will need wells and refineries. Dirty wells and refineries are undesirable anywhere--inland, desert or mountains, etc. Designing new facilities offers the best opportunity to make clean operations.

EVALUATION OF THE DRAFT E.I.S.
AS IT RELATES TO MARINE BIOLOGY INVERTEBRATES

By

Dr. Malcolm S. Gordon

Professor of Biology

University of California at Los Angeles

Evaluation of portions of Draft Environmental Statement
(No. DES 74-90) prepared by the Bureau of Land Management,
U.S. Department of the Interior, entitled "Proposed increase
in acreage to be offered for oil and gas leasing on the Outer
Continental Shelf." Portions evaluated relate to living
marine animals, especially invertebrates, in the affected
areas off southern California.

by

Malcolm S. Gordon

Professor of Biology and Director, Institute of Evolutionary
and Environmental Biology, University of California, Los
Angeles.

This report was prepared in response to a request from
Mayor Tom Bradley and City Attorney Burt Pines, both from the
City of Los Angeles, California. It constitutes the author's
professional and scientific evaluation of those parts of the
subject DES relating to living marine animals, especially
invertebrates, with primary emphasis on southern California
waters. It is structured around three primary issues.

1) The scientific accuracy of the data contained in the
subject DES;

2) The relevant gaps in the scientific data contained
in the subject DES;

3) Recommendations for studies needed to permit writing
of a fully adequate final EIS, with an estimate of how long such
studies would take.

This report recognizes that the subject DES is intentionally a generalized one (see ^{Vol. I,} p. 14 of DES). It assumes that the site-specific EIS's that would be prepared, if and when decisions were made to proceed with OCS oil and gas development in particular southern California areas, would be far more detailed. However, in order to help ensure that any later site-specific EIS's are adequately complete and detailed, this report is itself *more* comprehensive, specific and detailed.

1) Scientific accuracy of the DES:

A significant general question in this area is raised by some of the statements included in DES section IA3, "Under-^{Vol I.}lying assumptions" (pp. 14-17). On p. 16 the statement is made:

"Many of the impacts can be generalized for all the OCS regions. For example, the impact of spilled oil on phytoplankton is generally the same wherever it occurs, regardless of the species composition of the phytoplankton assemblage. What are more important are the levels of primary productivity in different areas; reductions of these levels have more significance to ecosystem vitality than a description of species most affected."

I seriously question the accuracy of this statement as it relates to phytoplankton, and I would strongly dispute the accuracy of any extension of this contention to animals. The impact of spilled oil on populations, associations, and communities of marine organisms is not uniform, independent of the species composition of affected assemblages. The impacts of such spills vary widely, and are influenced by multiple factors,

such as environmental temperatures, chemical compositions of oils, amounts of spill, mixing and/or dispersion rates of spills, etc. Different species and ecological groupings of organisms have widely varying responses to spills, as they do to other substantial environmental events, depending upon both the details of the physical-chemical conditions existing at the times and places of the events and the varying specific sensitivities of the different types of organisms affected. This assumption of uniform biological impacts of oil spills makes questionable the accuracy of the entire biological assessment.

A second aspect relates to the assumption that changes in levels of biological productivity are more important than other biological effects, such as possible changes in species composition. This is patently untrue. There are many situations in which man-caused pollution or other environmental changes have either not changed, or perhaps have even enhanced, overall biological productivity of environments, measured in any of several possible ways. In a large proportion of these situations, however, the changes have produced shifts in species composition and relative abundances of organismic assemblages which have converted the affected regions from economically valuable places to essentially worthless places in human terms. The aquatic populations and fisheries of the polluted parts of Lake Erie, in the Great Lakes, are one set of relevant examples.

A third aspect relates to the degree to which it is possible to generalize from the nature of biological impacts of oil and gas development in one OCS region to other OCS regions.

The DES tries to do this in a number of places, basing many estimates of impact seriousness upon experience (more or less well documented) from the Gulf of Mexico OCS development. The oceanographic climate and the biological populations in the southern California OCS region are very different from those in the Gulf of Mexico. The southern California OCS is significantly cooler, on a year round basis, is oceanographically far more variable from year to year, has a much greater habitat diversity, and is populated by organisms belonging to a different oceanic faunal assemblage. It is, therefore, highly unlikely that the sets of biological impacts of oil and gas development in the two regions will bear more than relatively superficial resemblances to one another.

The specific sections of the DES including materials relating to southern California marine animals, especially invertebrates, are: II A 3d; II B 3b; III A; III B; III C 1a; III C 2a; III E; V A, B, E, H; and VII C. Section III A, "Impact on the living component of the environment: an introduction," is a good, clear, concise, general outline of many of the important biological concerns relating to OCS oil and gas development.

The remaining sections are, by and large, reasonably accurate, factual general summaries of their subject areas. Emphasis must be placed on the word "general" since none of these sections are adequately specific and detailed with respect to the southern California OCS.

Almost all sections make clear that knowledge of biological environmental conditions, dynamics, and possible impacts of oil

and gas development on OCS "frontier areas," including those off southern California, is currently either absent or seriously deficient in many important respects. I agree most strongly and wholeheartedly with this opinion. The DES is very accurate in this respect.

There are many places in the sections listed in which the "underlying assumptions" discussed earlier are fairly explicitly relied upon in making tentative judgments concerning possible impacts of OCS development on the living organisms in and around the potential lease areas. Most of these statements are qualified in various ways. However, a variety of conclusions are reached which I do not believe to be accurate or justified. [Example (vol. II, pp. 169-170): "We believe that the plankton populations in the various geographic areas will be able to absorb the impact of a major oil spill and recover fairly rapidly. This is based partly on the lack of evidence (although attempts have been made) that plankton populations are catastrophically impaired by oil spills..." Comment: the evidence is that, at least to date, really adequately designed and carried out field and laboratory studies along these lines have not been done. Further, catastrophic impairment is not the only type of impairment that should be of serious concern.]

Overall, the listed sections of the DES are generally factually accurate as far as they go. However, they do not go far enough in many important respects. They reach a number of conclusions, many on the basis of the underlying assumptions discussed earlier, which are very probably inaccurate with respect to the southern California OCS. They are most accurate

when they say (e.g. section II B2, p. 188, lines 1 and 2):

"Again, the extent and significance of these impacts are impossible to predict..."

2. The relevant gaps in the scientific data contained in the subject DES; and

3. Recommendations for studies needed to permit writing of a fully adequate final EIS, with an estimate of how long such studies would take.

In early December 1974 the author of this evaluation acted both as chairman of a day long workshop session on marine plants and invertebrates, and as author of a report of the proceedings and conclusions of that workshop, all as part of a BLM-sponsored conference on southern California OCS oil and gas development. This conference was organized and administered by the southern California Academy of Sciences, and held on board the "Queen Mary" in Long Beach, California.

The workshop report discusses in some detail both of the subject matter areas involved in items (2) and (3). While the workshop report was not specifically structured around the DES under consideration here, it relates extremely well to the issues raised by the DES.

It identifies many major deficiencies in present knowledge concerning the floras and the invertebrate faunas of the southern California OCS. It also outlines a research program designed to provide a base-line of information on these subjects adequate to serve both as a standard for comparison for later monitoring and surveillance studies during possible OCS

developments, and as a basis for making predictions of probable biological impacts of OCS development. It includes time, staffing, and budget estimates for these studies.

Accordingly, the full text of that workshop report is appended herewith, with the recommendation that it be considered to supply the information requested in items (2) and (3).

REPORT AND STATEMENT OF THE PROCEEDINGS FROM THE WORKSHOP ON
BIOLOGICAL OCEANOGRAPHY (SECTION OF BOTANY AND INVERTEBRATES)

1

Malcolm S. Gordon
Department of Biology
and Institute of Evolutionary and Environmental Biology
University of California
Los Angeles, California 90024

I. Introduction

The workshop was well attended and actively participated in by a large portion of the audience. Proceedings began with a series of short introductory statements by the chairman and all members of the panel. The entire remainder of the day was devoted to a discussion of the general charge of the Conference, with focus on the biological oceanographic aspects of the charge. The morning session was a consideration of the major background factors involved. The main results of this discussion are incorporated in the Findings section of this report. The afternoon was devoted to a focussed discussion of the essential basic components of a minimum baseline study which could adequately take the background factors into account and provide a reasonable basis for predictive statements relating to possible biological impacts of outer continental shelf oil development. The Recommendations and Budget sections of this report describe the results of this discussion. The workshop ended with a consideration of major features which would need to be added to the minimum program in order to make it more

¹Chairman,
Panel presentations and discussion presented to the
Southern California Academy of Sciences at the
Queen Mary Conference Facility
Long Beach, California 90802
December 6, 1974

nearly an optimum program. These features are listed in the Optimum Study section of this report.

This report is presented in the form of an outline of the main points developed in each section of the workshop.

II. Findings

A. The nature of the biological situation in and around the potential oil drilling lease areas in the Continental Borderland region of the coastal waters off southern California.

1. The region includes a complex set of habitats: intertidal, subtidal, basins, ridges, epi-, meso-, bathy-, and benthopelagic. Each habitat has a characteristic flora (for the shallower portions) and fauna.

2. Both the flora and fauna of the region are unusually diverse, as compared with continental shelf and shore organismic associations in other parts of North America. Major reasons for this are:

- a. The basin and ridge structure of the bottom: each basin has characteristic species assemblages;
- b. The major biotic boundary located at Point Conception, at the northern edge of the region. The region is a transition zone between the Oregonian marine faunal and floral region and the Californian region. Species characteristic of both regions are present, as well as a substantial number of species endemic to the transition zone;

- c. The great temporal variability of the oceanographic climate, resulting from interactions between the California Current, the complex bottom topography, and seasonal changes in temperature, wind velocities, and directions, etc.

3. Despite the fact that this oceanic region is among the best known on earth, current knowledge of faunal and floral diversity, distribution, abundance, and dynamics is fragmentary, synoptic rather than detailed, and broadly inadequate to permit estimations of possible biological impacts of substantial oil development.

B. Other background considerations for design of proposed study.

1. A minimal study should be proposed - minimal in the sense that it includes:
 - a. all the components needed for a scientifically adequate, accurate, and reliable set of conclusions, but only those components;
 - b. will provide a reasonable basis for predictive statements concerning possible effects of oil and resource development, and;
 - c. will provide a sound foundation for assessment of the actual effects of whatever oil and resource development in fact takes place.

Anything significantly less complete than this study will not constitute a scientifically adequate program.

2. The major features that would need to be added to convert this minimal program to an optimal program should be itemized.

3. The program should not be restricted only to potential lease areas. It should include adjacent areas likely to be affected by movement of either surface oil slicks or water masses containing dissolved oil components.

4. The program should be devised around a system of priorities which emphasize the most biologically significant habitats, organisms, associations, and processes. It should not be a grouping of semi-independent basic projects.

5. The program should explicitly consider both possible short-term effects of catastrophic events (e.g., blowouts, ship spills) and possible long-term effects of chronic exposures of biotas to low levels of oil components in the water.

6. The program should be as well-managed, cost effective, and prompt in reaching its conclusions as is possible, compatible with the basic goal of scientific adequacy.

III. Recommendations

A. The minimal program proposed includes the following subjects:

1. Habitat surveys

a. A broad general survey of the region, including satellite and/or aircraft aerial photography using remote sensing techniques, and a grid of transects using apparatus such as "Deep Tow" (a package towed by a ship and including sidelooking sonar,

magnetometer, television, and still cameras).

This survey should provide a fairly detailed picture of the variety and distribution of major sea bottom types and habitats.

- b. Based on the results of (a), more detailed surveys should be made of areas chosen on the basis of the amount of present information that is available relating to habitats present. The proposed lease areas are all on ridges. The general habitat types present are likely to be broadly similar. Thus, detailed work should begin on the least known area. The priority list should be: i) the outermost areas; ii) the northern Channel Islands area; iii) the Santa Barbara Island and Santa Catalina Island areas; and, iv) the two inshore areas.
- c. In all of this, as well as all other aspects of the program, maximum use should be made of existing literature, charts, etc. The CALCOFI files at SIO and La Jolla NMFS are major repositories of much invaluable data.

2. Studies of organismic diversity, distribution, and abundance.

- a. Four major groupings of habitats need study in or near each of the potential lease areas: i) intertidal; ii) subtidal; iii) benthic; iv) pelagic (at all depths). From this point onward, the proposed

study will need to be replicated for each of the groups of lease areas priority ranked in 1 (b) above.

b. Surveys need to be made in each major habitat present of:

i) the variety of kinds of algae and animals present;

ii) the spatial and temporal distribution of the most significant of these organisms (significance judged on such bases as numbers, biomasses, positions in food webs, direct economic value);

iii) the relative abundances of these significant organisms.

c. Replicate samples should be taken at each sampling location.

d. Preferred survey methods are:

i) soft bottom benthos: clustered randomly distributed (within clusters) box cores;

ii) hard bottom benthos: scuba surveys for shallow area, associated with actual collections of organisms; unmanned television and manned submersible surveys of areas of greater depths;

iii) pelagic habitats: CALCOFI data may be adequate for the epipelagic organisms; if not, Hardy plankton recorders or comparable surveys will be needed; mesopelagic and bathypelagic organisms require Bongo nets for small forms, opening and closing Tucker trawls for larger forms;

iv) kelp beds and other macro-algae areas: aerial photography and scuba;

v) intertidal and subtidal: transects or point sampling arrays, on foot and with scuba

3. Studies of ecological dynamics

a. Laboratory studies are needed to:

i) develop understanding of food webs in the different habitats;

ii) determine tolerances and resistances of the dominant organisms or groups of organisms in the major habitats to the presence of relevant levels of oil components, heavy metals, or other substances likely to enter the sea as a result of oil and resource development;

iii) determine possible effects of substances likely to enter the sea from oil developments on major life history aspects of dominant organisms or groups of organisms, such as, rates of growth, longevity, fecundity, nutrition, and pathology;

iv) determine the biological concentration factors in the bodies of dominant organisms or groups of organisms for important substances likely to enter the sea;

v) determine the effects on other organisms in the food webs of feeding upon organisms containing high body burdens of important substances.

b. Field studies are needed to:

- i) test the validity of laboratory studies of food webs in the different habitats;
- ii) experimentally test, on selected representative small tracts of the major floral and faunal associations in the shallow water portions of the major habitats, the effects of both short-term heavy exposures and longer term low-level exposures to oil components, heavy metals, or other substances likely to enter the sea as a result of oil and resource development (parallel studies of matched, untreated control tracts will be essential here).

B. The time frame for a complete minimal study of one area would be five (5) years.

1. The time frame includes:

a. start up time;

b. three full annual cycles of field work, each cycle including replicate floral and faunal surveys as described in A (2), four times per year;

c. data reduction, calculation, annual and final (published) report writing.

2. This time frame does not include the continuing monitoring program which must follow this initial program, to keep track of actual effects of oil developments. The degree to which the monitoring program can be simpler than the initial program should be determined on the basis of the first 2 - 2 1/2 years of the initial program.

C. Staffing

1. Five scientific-technical teams are needed. They are, with estimates of the numbers of professional (prof.) and technical (tech.), in each:

a. subtidal and intertidal: 5 prof, 20 tech;

b. benthic: 5 prof, 20 tech;

c. pelagic: 5 prof, 20 tech;

d. algae: 5 prof, 20 tech;

e. dynamics: 4 prof, 6 tech.

Total scientific-technical staff would be approximately 24 professionals and 86 technicians.

2. Two support groups are needed:

- a. administrative;
- b. automatic data processing

No number estimates are made for these.

D. Facilities

1. Major facilities needed for this program include:

- a. adequate shore laboratory facilities, including sea water system and aquarium facilities;
- b. research vessel with capacities for trawling, dredging, and support for diving and submersible operations;
- c. several small boats;
- d. a submersible - by rental;
- e. provision for long term maintenance of voucher collections of organisms;
- f. computer support;
- g. other necessary laboratory equipment.

2. These facilities should clearly be obtained, as much as possible, through payment for use of existing items, rather than as new capital expenditures.

E. Budget

Rough estimates of annual costs are:

- 1. Salaries \$ 1.40 million;
- 2. Fringe benefits 0.25 million;
- 3. Ship costs 0.75 million (can be shared with other components of the program);

4. Submersible rental	0.12 million;
5. Supplies	0.40 million;
6. Equipment	0.30 million 1st year, 0.10 million for next 3 years;
7. Travel	0.05 million;
8. Miscellaneous	0.05 million;
Total direct costs	\$3.32 million - first year, \$3.12 million - next three years \$3.02 million - fifth year;
Overhead (At 34 percent of direct costs)	\$1.1 million;
Total costs	\$4.4 million - first year, \$4.2 million - next three years, \$4.1 million - fifth year;

IV. Optimum Studies

Major add-ons that would bring the recommendations up from the minimal level outlined to a more optimal level include:

- A. Capacity to carry on equivalent studies in additional (ideally all) significant regions likely to be involved in oil or other submarine mineral production. This includes the furthest offshore, the middle and the inner ridges of the Continental Borderland. The incremental cost of this expansion should be much less than the stated cost of the first program.
- B. In addition to the studies listed under III A (2), more detailed phytoplankton studies, including productivity.

- C. Expansion of the ecological dynamics program to include such aspects as energy flows through food webs, and other important and relevant physiological and behavioral features of dominant organisms.

EVALUATION OF E.I.S. AS IT RELATES
TO MARINE BIOLOGY-INVERTEBRATES

Dr. James G. Morin
Department of Biology
University of California at Los Angeles

January 24, 1975

TO: The City of Los Angeles,
Mayor Tom Bradley and City Attorney Burt Pines

FROM: Dr. James G. Morin
Department of Biology
University of California
Los Angeles, California

RE: Evaluation of the southern California marine invertebrate sections
of the Bureau of Land Management's Draft Environmental Statement
"Proposed increase in acreage to be offered for oil and gas leasing
on the outer continental shelf" (DES 74-90).

I have been requested by the City of Los Angeles to evaluate, with respect to southern California marine invertebrate zoology, the overall accuracy and thoroughness of the Bureau of Land Management's (BLM) Outer Continental Shelf (OCS) Draft Environmental Statement (DES) numbered DES 74-90. I was also asked to indicate areas of further study and a possible time table.

My basic evaluations are:

- 1) The data presented in the DES, as far as they go and with some exceptions, are accurate.
- 2) The DES makes no claim to being complete (Vol 1, pp 14-16). However, I feel this report shows a lack of inquiry into the available literature to the point that essential information has been excluded.
- 3) In assessing the possible affects of normal drilling activities and accidental spills on marine communities, the report does not consider recent predictive and theoretical research into the structure of marine communities.

The DES represents a prodigious, but clearly not comprehensive report. Considering the massive scope of the report it is not surprising that a fair degree of completeness had to be sacrificed. I especially feel that the sections dealing with the biological aspects are generally vague and deficient. Therefore, the remainder of my report will focus only upon the organismic and ecological aspects of the DES as they relate to the marine invertebrates of the west coast and specifically to southern California.

1) Accuracy and 2) Completeness of the DES.

The data presented in the DES, as far as they go and with some exceptions, are accurate. But there are fundamental shortcomings. These include imprecision, incompleteness and faulty interpretations.

One imprecision that I encountered was in distinguishing what was considered offshore environment (section IIA) and the nearshore environment (section IIB). The net result seemed to be to consider the nearshore marine environments, with respect to benthic communities, to be only 1) the intertidal and 2) bays and estuaries (Vol. II, pp 2-12). On the other hand and although it was not specified, the offshore environments were vaguely discussed in terms of 1) the "nearshore area" (from shore to approximately 300 feet) and 2) the deep areas of basins, troughs and submarine canyons (Vol. I pp 434-440). This distinction is very important and the shallow benthic (and planktonic) communities are significantly different from deep communities. I would suggest that, until more precise data are available, the 300 foot level be used as a convenient line of demarcation between nearshore (or shallow) and offshore (or deep) areas.

With respect to the biological materials, I consider that an inadequate general survey was made. The bibliography lists only a few governmental reports, some old surveys and a general ecology text. Much new and relevant material has since appeared which largely supercedes or modifies these sources. In recent years, along with long term purely scientific research, a considerable number of governmental agencies (particularly state and local) and private companies (PG and E, Edison, etc.) have either begun studies themselves or contracted with consulting firms to evaluate various aspects of the quality (and quantity) of the marine environment in southern California. Thus, contrary to indications from the DES, there has been a tangible amount of information which is publicly available concerning the O.C.S. of southern California. I include a bibliography of some potentially useful recent references. Even with such information I still consider the available information to be inadequate in order to thoroughly evaluate the impact of the intended leases. Direct sampling and research will be required before final decisions should be reached.

While the deep regions remain relatively poorly studied, the shallow sectors are becoming relatively well known even though the DES devotes but

two pages to this region (from the middle of page 435 to the middle of page 437). Included within the boundaries of this region are our ecologically and economically important extensive kelp beds which overlies immense stretches of rock reefs. These kelp forests and their accompanying reefs are some of the most productive and ecologically significant habitats in the world. They support a productive fishery for fish and shellfish. The DES report ignores the kelp beds entirely in this section and further states that "rocky outcrops on the continental shelf in this area are relatively uncommon." (I refer you to the report of Dr. Chapman for particular consideration of the kelp bed aspects of the report). Clearly the report has overlooked some important habitats within the southern California OCS.

Throughout the report it is either implicate or implied that "the duration of the impact [from construction and spills], will be short, with recolonization being completed within a year or two" (Vol. II, p. 180). My own belief is that benthic communities may suffer long term detrimental effects from any aspect of the drilling operation but more importantly from spills, whether they be major or minor. Most of the spills that have been analyzed with respect to shallow benthic destruction have stressed the amount of depopulation and subsequent recovery with respect to total numbers or biomass and without respect to all of the members of the community or to former community structure. What has been shown in these studies is that, in areas of extensive spill damage, the members of the community which have a rapid life cycle and rapid rate of growth recover very quickly by larval recruitment from unaffected areas. However, it is often the long lived organisms, (whether they be primary producers, suspension feeders, predators, etc.) that exert a major influence upon the final stable community structure of a given habitat (Paine 1966, 1971, 1974; Dayton 1971; Porter, 1972). Thus, while there is the superficial appearance of a rapid community recovery, it is very probably illusory and may represent only the initial stages of a succession that may take many years to regain the former stability. Many of these long lived organisms which I referred to above are sessile or sedentary and, therefore, cannot escape a spill. Fishes and the larger crustaceans may be able to escape a local spill via their mobility.

Such long term adverse effects could be expected for any benthic community, be they hard substrate (rock, piling, etc.) or soft (sand, mud, etc.),

shallow or deep. The kelp forest is a particularly vulnerable and delicate environment where some of the most elaborate inter-relationships known on earth occur. Another habitat, one which I have been carrying out basic ecological research on for five years, is the shallow subtidal (10 to 50 ft.) sand habitat. I will use it as an example. Of this type of habitat the DES report states "sandy areas in depths of 10 to 30 feet are relatively harsh environments due to an unstable bottom which shifts because of wave action. The number of individuals is not significantly lower in comparison with the deeper bottoms, however. [It is in fact significantly higher] The types that have adapted to the shifting sands include those that occupy transient or relatively permanent deep burrows, . . . " (Vol. I p. 437). While it is true that the sand bottom is a harsh habitat, the shallow sand is not depauperate but represents an extremely important community. Merrill, and Hobson (1970) have shown quite conclusively that a large number of our California beaches are dominated by enormous numbers of the sand dollar Dendraster excentricus in depths of 10-50! The densities of these organisms can reach as high as over 1,200 per square meter (each individual averages about 2-2 1/2 inches in diameter). They clearly dominate the whole region and almost certainly provide the largest biomass within any sand to mud habitat from the intertidal to the deepest basins within the southern California OCS. The sand dollar is a suspension feeder which eats mainly living microscopic phytoplankton, (contrary to what is implied within the DES for most benthic animals Vol. 1, p. 435). Furthermore, I have found (Morin et.al. in preparation, as well as Merrill and Hobson, 1970) that the sand dollar bed lies within a distinct zone and that certain organisms form an association with the sand dollars such that the community on either side of the sand dollar bed is different from that within the bed. Elimination of the sand dollar population as a result of an oil spill or other catastrophe would drastically alter the whole shallow sand community structure. These changes almost certainly would not be short term. The average age of the sand dollar population we are studying is 9 years and they live as long as 13 years. It takes several years to attain sexual maturity. Thus restoration of a viable sand dollar bed and its associated community elements would undoubtedly take several years. Furthermore, the dominant organisms (these include the Pismo clam, Tivela stultorum, the sea pansy, Renilla Kolliker:, the sea pen, Stylatula elongata, and the sand stars Astropecten

armatus and A. californicus) in the areas around the sand dollar bed are also fairly long lived animals (three to forty years depending on the species) so that their demise might further affect the community structure following a catastrophe. The effects that the absence of all of these dominant, long lived organisms would have on the overall structure and productivity of the area cannot be predicted at this point in time, but it almost certainly would be negative and substantial.

For rocky habitats in other parts of the world which are comparable to our own, such as Washington state, there are some data which demonstrate the effects of removal of long lived dominant members of the community (Paine, 1966, 1974, Dayton, 1971). These results indicate that the dominant members have a dramatic effect with respect to diversity and abundances.

There are no comparable data for any of our OCS deep benthic communities. We do know that at least some of the epifauna are long lived (eg. some of the sea pens) and, on the basis of abyssal bottom studies, we know they are usually very stable (Dayton and Hessler, 1972, Sanders, et.al., 1965). The deep sea is also very cold, being only a few degrees above 0°C. Dayton et.al. (1970,1974) have studied what appears to be a somewhat comparable shallow water rock and mud bottom community in the Antarctic and have found that growth, predation, competition, etc. are extremely slow in these cold waters. Perturbations in those communities affect them for years. If this antarctic region is found to be comparable to the deep benthos, then we would expect that a damaged deep water community might not recover for many years. Damage to these communities would come primarily from dumping of the drilling muds, other construction materials and perhaps from entrapped oils from bottom blowouts. The extent of these deep sea communities is probably very large and hence local dumping would probably effect only a fraction of the community. However, we do not know enough about this region to be able to adequately predict the results of such activities.

Not only might recovery from damage be slow in all of the above mentioned areas, but also the community that appears after recovery need not be the same as what was there prior to the alteration. Recent experimental evidence has shown that a community can have an exceedingly different structure at stable equilibrium depending on the prior history of that habitat (Sutherland, 1974). That is, the stable community that finally develops in a habitat following major (or even perhaps minor) destruction [by an oil spill (or

mud or other dumping, etc.)) will not necessarily be at all the same as what existed before.

Of additional concern not specified in the DES should be the consideration of deleterious, sublethal affects of oil spills and other related oil activity on the physiology and behavior of community members. The results may be similar to total destruction of a species as described above. Similarly there is the potential for synergistic effects between oil related effluents and other pollutants (such as sewage). Thus, while each alone demonstrates little or no effect, together they might show serious alterations within benthic or planktonic communities.

Furthermore, it is evident that man's activities in the southern California area have substantially effected the overall quality of our local biota (Fay, 1972 a,b). Much work is now being done by many sectors to attempt to correct or alleviate these problems. It seems to me that we should be exceedingly cautious in expanding similar potential hazards to even more distant areas than have already been effected.

Therefore, to summarize what should have been done to eliminate the ambiguities and incompleteness: First and foremost, the DES shows a real lack of inquiry into the available literature to the point that essential information has been excluded. I would suggest that before the DES is finalized there should be 1) a careful consideration of the available literature, 2) a close liaison with local, state and private agencies which have much information held in public trust, 3) a careful comparison of local community structure with similar more thoroughly studied ones elsewhere, and 4) a serious evaluation of recent predictive and theoretical ecological findings on marine communities in order to provide possible clues to what might be relevant for our local waters.

3) Additional studies and time estimates

Extensive studies must be undertaken to thoroughly evaluate the potential lease sites with respect to the benthic and planktonic communities present. These communities should be assessed with respect to 1) their distributions (unique and restricted to cosmopolitan), 2) their structure (ecological inter-relationships, food webs, etc.), 3) their ecological and physiological durability (are they easily damaged and fragile or do they tolerate perturbations [types need be specified] well?), and 4) their

ability to recover (including time and previous structure). All of these studies from baseline "alpha" ecology to predictive and functional aspects should commence at least three years prior to any development and continue throughout the entire project to monitor the environment. The leasing agency should be given full authority to prohibit or terminate any activities that prove detrimental to Vital communities within the OCS region.

As a final note in this regard, all estuaries and other areas designated by governmental agencies (State Water Quality Control Board, State Coastal Zone Commission, etc.) should receive special consideration and protection.

Respectfully submitted,

James G. Morin

By James G. Morin

James G. Morin

Assistant Professor of Biology

BIBLIOGRAPHY

1. Allan Hancock Foundation, USC (1957). A preliminary report on the biology of the continental shelf of southern California. California State Water Pollution Control Board.
- *2. Allan Hancock Foundation, USC (1965). An oceanographic and biological survey of the southern California mainland shelf. California State Quality Control Board, publ. No. 27, 232pp.
3. Alvarino, Angeles (1967). Bathymetric distribution of Chaetognatha, Siphonophorae, Medusae & Ctenophorae off San Diego, Calif. *Pac Sci* 21 (4):474-485.
4. Barnard, J. (1963). Relationship of Benthic Amphipoda to invertebrate communities of inshore sublittoral sands of southern California. *Pac. Nat.* 3 (15):439-467.
5. Barnard, J. (1966). Submarine Canyons of southern California. Pt. V; Systematics Amphipoda. *Allan Hancock Pac. Expeds.* 27 (5):1-66.
6. Barnard, J. and D. Hartman (1959). The sea bottom off Santa Barbara, California. Biomass and community structure. *Pac. Nat.* 1 (6):1-16.
7. Bright, D. (1972). Proceedings of the southern California Coastal Zone Symposium.
8. Brusca, G. (1967). The ecology of Pelagic Amphipoda, Pt. I; Species accounts, vertical zonation & migration of amphipoda from the waters off southern Calif. *Pac. Sci.* 21 (3):382-393.
9. Brusca, G. (1967). Ecology of Pelagic Amphipoda, Pt. II; Observations on the reproductive cycles of several pelagic amphipods from waters off southern Calif. *Pac. Sci.* 21 (4):449-456.
10. California Department of Parks and Recreation (1971). California Coast-line Preservation and Recreation Plan.
11. California State Water Resources Control Board (1972). Water Quality Control Plan, Ocean Waters of California. Guidelines for the preparation of technical reports on waste discharges to the ocean and for monitoring the effects of waste discharges on the ocean.
12. California State Water Resources Control Board (1974). Water Quality Control Plan Report; Los Angeles River Basin (4B). Regional Water Quality Control Board, Los Angeles Region (4).
13. Caplan, R. and R. Boolootian (1967). Intertidal ecology of San Nicolas Island. *Proc. Symp. Biol. Calif. Islands, Santa Barbara Botanical Garden*, 203-217pp.
14. Carlisle, J. G., Jr. (1969). Results of a six-year trawl study in an area of heavy waste discharge. Santa Monica Bay, California. *Calif. Fish & Game* 55 (1):26-46.

* Indicates references cited in the DES 74-90 report.

15. Carlisle, J. G., Jr. (1969). Invertebrates taken in six year trawl study in Santa Monica Bay. *Veliger* 11:237-242.
16. Clarke, W. D. and M. Neushul (1967). Ecology of southern California Coast. In "Pollution and Marine Ecology", T. A. Olson and F. J. Burgess, eds., 29-42 pp. Interscience publ., N. Y.
17. Clarke, T. A., A. O. Flechsig and R. W. Grigg (1967). Ecological studies during Project Sealab II. *Science* 157 (3795):1381-1389.
18. Connell, J. H. (1963). Territorial behavior and dispersion in some marine invertebrates. *Res. on Pop. Ecol.* 5 (2):87-101.
19. Dayton, P. K. (1971). Implications of pollution to the McMurdo Sound Benthos. *Antarctic J. of the U. S.* 6 (3):53-56.
20. Dayton, P. K. (1971). Competition, disturbance, and community organization: The provision and subsequent utilization of space in a rocky intertidal community. *Ecol. Monogr.* 41:351-389.
21. Dayton, P. K. (1972). Toward an understanding of community resilience and the potential effects of enrichments to the Benthos at McMurdo Sound, Antarctica. In "Proceedings of the Colloquium on Conservation Problems in Antarctica", B. C. Parker, ed., Allen Press.
22. Dayton, P. K. and R. R. Hessler (1972). Role of biological disturbance in maintaining diversity in the deep sea. *Deep Sea Res.* 19:199-208.
23. Dayton, P. K., G. A. Robilliard and R. T. Paine (1970). Benthic Faunal zonation as a result of anchor ice at McMurdo Sound, Antarctica. *Antarctic Ecol.* 1, M. Holdgate, ed., Academic Press.
24. Dayton, P. K., G. A. Robilliard, R. T. Paine and L. B. Dayton (1974). Biological accommodation in the Benthic community at McMurdo Sound, Antarctica. *Ecol. Monogr.* 44 (1):105-128.
25. Edwards, D. C. (1969). Zonation by size as an adaptation for intertidal life in *Olivella biplicata*. *Amer. Zool.* 9:399-417.
26. Egstrom, G. H. (1974). The Los Angeles County Underwater Resource Inventory. University of Calif., Sea Grant Program. 284pp.
27. Eltringham, S. K. (1971). Life in Mud and Sand. Crane, Russak & Co., Inc., N. Y., 218pp.
- *28. Emery, K. O. (1960). The Sea off Southern California. John Wiley & Sons, Inc., N. Y., London, 366pp.
29. Emery, K. O. and J. Hülsemann (1963). Canyons of southern California, Pt. I; Topography, Water and Sediments. Allan Hancock Pacific Expeditions 27 (1):1-80.
30. Fager, E. W. (1968). A sand-bottom epifaunal community of invertebrates in shallow water. *Limnol. & Oceanog.* 13 (3):448-464.

31. Fager, E. W. (1971). Pattern in the Development of a Marine Community. *Limnol. & Oceanog.* 16 (2):241-253.
32. Fay, R. C. (1972). Deteriorating Marine Environment. So. Calif. Assoc. of Gov. Report.
33. Fay, R. C. (1972). An Evaluation of the Health of the Benthic Marine Biota of Ventura, Los Angeles, And Orange Counties. In "Coastline Planning Program, Inshore Waters Inventory, Southern California Assoc. of Governments.
34. Fay, R. C. and J. V. Johnson (1972). Observations on the distribution & ecology of the littoral ascidians of the mainland coast of southern California. *So. Calif. Acad. Sci. Bull.* 70 (30):114-124.
35. Gardner, B. S., ed. (1971). The Crowded Coast; The Development and Management of the Coastal Zone of California, University of Southern Calif., Center for Urban Affairs.
36. Given, R. R. and D. C. Lees (1967). Santa Catalina Island Biological Survey, Report #1, Covering the period from August through December, 1965. University of Southern California, Allan Hancock Foundation.
37. Grigg, W. and R. S. Kiwala (1970). Some ecological effects of discharged wastes on marine life. *Calif. Fish & Game* 56 (3):145-155.
38. Hall, C. A. (1964). Shallow water marine climates and molluscan provinces. *Ecology*, 45 (2):226-234.
40. Hartman, D. (1956). Contributions to a Biological Survey of Santa Monica Bay, Calif.
- *41. Hartman, O. (1963). Submarine Canyons of Southern Calif., Pt. II; Biology. *Allan Hancock Pac Exp.* 27 (a):1-424.
42. Hartman, O. (1966). Quantitative survey of the Benthos of San Pedro Basin, southern Calif., Pt. II; Final results and conclusions. *Allan Hancock Pac. Exp.* 19 (2):185-456.
43. Hartman, O. (1968). Atlas of the errantiate polychaetous annelids from California. Allan Hancock Foundation, Univ. So. Calif., 838pp.
44. Hartman, O. (1969). Atlas of the sedentariate polychaetous annelids from California. Allan Hancock Foundation, Univ. So. Calif., 812pp.
45. Heezen, B. C. and C. D. Hollister (1971). The Face of the Deep, Oxford University Press, N. Y. 659pp.
46. Hewatt, W. G. (1946). Marine ecological studies on Santa Cruz Island, Calif. *Ecol. Monogr.*, 16:185-210.
47. Holm-Hansen, O., J. D. H. Strickland, and P. M. Williams (1966). A detailed analysis of biologically important substances in a profile off southern Calif. *Limnol. and Oceanogr.* 11 (4):548-561.

48. Irwin, H. I. (1973). The intertidal behavior of the bean clam, Donax gouldii, Dall, 1921. Veliger 15:206-212.
49. Jones, G. F. (1965). The distribution and abundance of subtidal Benthic Mollusca on the mainland shelf of southern Calif. Malacologia, 2 (1):43-68.
50. Jones, G. F. (1969). The Benthic Macrofauna of the mainland shelf of southern Calif. Allan Hancock Mon. Mar. Biol. 4:1-219.
51. Keen, A. M. and E. Coan (1974). Marine Molluscan Genera of Western North America an illustrated key, second ed., Stanford University Press, 208pp.
52. Levins, R. (1968). Evolution in changing environments. Princeton U. Press. 120pp.
53. Levinton, J. (1972). Stability and trophic structure in deposit-feeding and suspension-feeding communities. Am. Nat. 106:472-486.
54. Limbaugh, C. (1955). Fish life in the kelp beds and the effects of kelp harvesting. Univ. Calif. Inst. Mar. Res., IMR Ref. 55-59, 158pp.
55. Los Angeles County Regional Planning Commission (1973). Los Angeles County General Plan Conservation Element Technical Report.
- *56. Menzies, R. J., R. Y. George and G. T. Rowe (1973). Abyssal Environment and Ecology of the World Oceans, John Wiley & Sons, N. Y., 488pp.
57. Merrill, R. J. and E. S. Hobson (1970). Field Observations of Dendraster excentricus, a sand dollar of western North America. Amer. Midland Nat. 83:595-624.
58. Meyer, R. E., ed. (1972). Waves on Beaches and Resulting Sediment Transport. Academic Press, N. Y., London, 462pp.
59. Navy, the Dept. of the (1974). The San Clemente Island Conference on Marine Biology in Environmental Protection. (13-15, Nov. 1973), Naval Undersea Center, San Diego.
60. Newell, R. C. (1970). Biology of Intertidal Animals, American Elsevier Publishing Co., Inc., N. Y., 555pp.
61. North, W. J. (1964). Ecology of the rocky nearshore environment in southern California & possible influences of discharge d wastes. In Advances in Water Pollution Research Vol. 3, Pergamon Press, N. Y., 247-262.
62. North, W. J. (1967). Integration of environmental conditions by a marine organism. In "Pollution and Marine Ecology" ed. Theodore A. Olson and F. J. Burgess., N. Y.: Interscience Pub. of Wiley & Sons., 195-222pp.
63. North, W. J. (1971). The Biology of Grant Kelp Beds (Macrocystis) in California, J. Cramer, Publ. Germany.
64. Nybakken, J. W., ed. (1971). Readings in Marine Ecology. Harper and Row, N. Y., 544pp.

65. Paine, R. T. (1966). Food web complexity and species diversity. *Amer. Nat.* 100:65-75.
66. Paine, R. T. (1971). A short-term experimental investigation of resource partitioning in a New Zealand rocky intertidal habitat. *Ecology* 52 (6): 1096-1106.
67. Paine, R. T. (1974). Intertidal community structure. Experimental studies on the relationship between a dominant competitor and its principle predator. *Oecologia* 15:93-120.
68. Palos Verdes Estates Planning Commission (1970). Proposed Master Plan for Palos Verdes Estates Shoreline Preserve.
69. Pequegnat, W. E. (1963). Population dynamics in a sublittoral epifauna. *Pac. Sci.* 17:424.
- *70. Pequegnat, W. E. (1966). The epifauna of a California siltstone reef. *Ecology* 45 (2):272-283.
71. Pequegnat, W. E. (1968). Distribution of epifauna biomass on a sublittoral rock-reef. *Pac. Sci.* 22:37.
72. Porter, J. W. (1972). Predation by *Acanthaster* and its effect on coral species diversity. *Amer. Nat.* 106:487-492.
73. Reish, D. J. (1961). A study of benthic fauna in a recently constructed boat harbor in southern California. *Ecology* 42 (1):84-91.
74. Ronhold, L. L. (1963). Distribution and relative abundance of commercially important Pandalid Shrimps in the northeastern Pacific Ocean. U. S. Fish Wildlife Service, Spec. Sci. Rept. Fish 449.
75. Sanders, H. L. (1968). Marine benthic diversity: a comparative study. *Am. Nat.*, 102:243-282.
76. Sanders, H. L., R. R. Hessler, and G. R. Hampson (1965). An introduction to the study of deep-sea benthic faunal assemblages along the Cay Head-Bermuda transect. *Deep-sea Res.* 12:845-867.
77. Schoener, A. (1974). Colonization curves for planar marine islands. *Ecology* 55:818-827.
78. Schoener, A. (1974). Experimental Zoogeography: Colonization of marine mini-islands. *Amer. Nat.* 108:715-738.
79. Shepard, F. P. (1973). *Submarine Geology*, Third Ed., Harper & Row, Pub., N. Y., 517pp.
80. Shepard, F. P. and R. F. Dill (1966). "Submarine Canyons and Other Sea Valleys" (Rand McNally & Co., Chicago, Ill.
81. Simberloff, D. S. (1969). Experimental zoogeography of islands: a model for insular colonization. *Ecology* 50:296-314.

82. South Coast Regional Commission (1974). Life in the Sea. Calif. Coastal Zone Conservation Commission.
- *83. Southern California Coastal Water Research Project (1973). The ecology of the Southern Calif. Bight: Implications for water quality management.
84. Steele, J. H. (1974). The Structure of Marine Ecosystems, Harvard Uni. Press, Cambridge, Mass., 128pp.
85. Stephenson, T. A. and A. Stephenson (1972). Life between tidemarks on rocky shores. Freeman, 425pp.
86. Sutherland, J. P. (1974). Multiple stable points in natural communities. Amer. Nat. 108:859-873.
87. Swedmark, B. (1964). The interstitial fauna of marine sand. Biol. Rev. 39:1-42.
88. Thorson, G. (1946). Reproduction and larval development of Danish marine bottom invertebrates, with special reference to the planktonic larvae in the Sound (Öresund). Meddel. Komm. Danmarks Fisk. og Havunders. (Plankton), 4 (1):523pp.
89. Thorson, G. (1966). Some factors influencing the recruitment and establishment of marine benthic communities. Neth. J. Sea Res., 3 (2):267-293.
90. Turner, C. H. & A. R. Strachan (1969). The marine environment in the vicinity of the San Gabriel River mouth. Calif. Fish & Game 55 (1):53-68.
91. Turner, C. H., E. E. Ebert & R. R. Given (1964). An ecological study of a marine environment prior to installation of a submarine outfall. Calif. Fish & Game 50 (3):176-188.
92. Turner, C. H., E. E. Ebert & R. R. Given (1965). Survey of the marine environment offshore of San Elijo Lagoon, San Diego County. Calif. Fish & Game 51 (2):81-112.
93. Turner, C. H., E. E. Ebert and R. R. Given (1966). The marine environment in the vicinity of the Orange County Sanitation District's ocean outfall. Calif. Fish & Game 52 (1):28-48.
94. Turner, C. H., E. E. Ebert and R. R. Given (1966). The marine environment offshore from Point Loma, San Diego County. Calif. Dept. Fish & Game, Fish Bull. 140:1-79.
95. Turner, C. H., E. E. Ebert and R. R. Given (1969). Man-made reef ecology. Calif. Fish and Game, Fish Bull. 146:221.
96. Vogl, R. J. (1966). Salt marsh vegetation of upper Newport Bay, Calif. Ecology 47 (1):80-87.
97. Wasmer, R. A. (1969). New records for four deep-sea shrimps from the northeastern Pacific. Pac. Sci. 26:259-63.
98. Wieser, W. (1959). The effect of grain size on the distribution of small invertebrates inhabiting the beaches of Puget Sound. Limnol. & Oceanogr. 4 (2):181-194.

REFERENCES BY TOPIC

I. General Books Dealing with the Marine Benthos:

Eltringham, 1971
Emery, 1960
Heezen & Hollister, 1971
Menzies, George & Rowe, 1973
Meyer, 1972
Newell, 1970
Nybakken, 1971
Shepard, 1973
Shepard & Dill, 1966
Steele, 1974
Stephenson & Stephenson, 1972

II. Special Reports Dealing with the Southern California Coast and Outer Continental Shelf:

Bright, 1972
California Department of Parks and Recreation, 1971
California State Water Resources Control Board, 1972
California State, 1974
Egstrom, 1974
Fay, 1972 (a)
Fay, 1972 (b)
Gardner, 1971
Los Angeles County Regional Planning Commission, 1973
Navy, Dept. of the, 1974
Palos Verdes Estates Planning Commission, 1970
South Coast Regional Commission, 1974
Southern California Coastal Water Research Project, 1973

III. Distributional and Ecological Papers on the Fauna of Southern California:

A. Benthic

Allan Hancock Foundation, USC, 1957
Allan Hancock Foundation, USC, 1965
Barnard, J., 1963
Barnard, 1966
Barnard & Hartman, 1959
Caplan & Boolootian, 1967
Carlisle, 1969
Clarke & Neushul, 1967
Clarke, Flechsig, & Grigg, 1967
Edwards, 1969
Emery & Hilseemann, 1963
Fager, 1968
Fager, 1971

References by Topic (2)

Fay & Johnson, 1972
Given & Lees, 1967
Hartman, 1956
Hartman, 1963
Hartman, 1966
Hartman, 1968
Hartman, 1969
Hewatt, 1946
Holm-Hansen, Strickland, & Williams, 1966
Irwin, 1973
Jones, 1965
Jones, 1969
Keen & Coan, 1974
Limbaugh, 1955
Merrill & Hobson, 1970
North, 1967
North, 1971
Pequegnat, 1963
Pequegnat, 1966
Pequegnat, 1968
Reish, 1961
Ronhold, 1963
Turner, & Strachan, 1969
Turner, Ebert, & Given, 1964
Turner, Ebert, & Given, 1965
Turner, Ebert, & Given, 1966
Turner, Ebert, & Given, 1969
Vogl, 1966
Wasmer, 1969

B. Planktonic

Alvarino, 1967
Brusca, 1967 (a)
Brusca, 1967 (b)

IV. Pollution Related Southern California Studies:

Carlisle, 1969
Grigg & Kiwala, 1970
North, 1964
Turner, Ebert, & Given, 1966

References by Topic (3)

V. Other Relevant Ecological Papers:

A. West Coast

Connell, 1963
Dayton, 1971
Hall, 1964
Paine, 1966
Paine, 1974
Wieser, 1959

B. Antarctic

Dayton, 1971
Dayton, 1972
Dayton, Robilliard & Paine, 1970
Dayton, Robilliard, Paine & Dayton, 1974

C. Deep Sea

Dayton & Hessler, 1972
Sanders, Hessler & Hampson, 1965

D. Other

Levins, 1968
Levinton, 1972
Paine, 1971
Porter, 1972
Sanders, 1968
Schoener, 1974 (a)
Schoener, 1974 (b)
Simberloff, 1969
Sutherland, 1974
Swedmark, 1964
Thorson, 1946
Thorson, 1966

EVALUATION OF THE DRAFT E.I.S.
AS IT RELATES TO MARINE BIOLOGY-VERTEBRATES

by

Dr. Malcolm S. Gordon

Professor of Biology

University of California at Los Angeles

Evaluation of portions of draft Environmental Statement (No. DES 74-90) prepared by the Bureau of Land Management, U.S. Department of the Interior, entitled "Proposed increase in acreage to be offered for oil and gas leasing on the Outer Continental Shelf." Portions evaluated relate to living marine animals, especially vertebrates, in the affected areas off southern California.

by

Malcolm S. Gordon

Professor of Biology and Director, Institute of Evolutionary and Environmental Biology, University of California, Los Angeles.

This report continues the evaluation of the subject DES begun by the author in the accompanying report on marine invertebrates. This report relates to marine vertebrates, including fishes, birds and mammals. It is structured in parallel to the report on invertebrates.

1) Scientific accuracy of the DES:

The general comments made in the report on invertebrates apply equally strongly to the vertebrate sections. The specific sections of the DES including materials relating to vertebrates are the same as those listed in the invertebrate report.

As was the case with respect to the invertebrates, the DES draws several questionable conclusions concerning likely impacts of oil and gas development on marine vertebrates. For example:

On p. 173, vol. II (section III B1), the statement is made with respect to nektonic animals (nekton are animals large

enough and strong enough to swim actively under their own power for significant distances): "Therefore, the only significant impact on the nekton would be as a result of a massive oil spill which they cannot quickly avoid."

This is incorrect on several grounds. While a massive oil spill might be one of the few ways in which oil and gas development could cause rapid disability or death in many adult nektonic animals, especially fishes, this is not the case with respect to the young of many of these forms. Nektonic fishes frequently have surface layer dwelling, pelagic eggs, larvae and juveniles, and often form important parts of the zooplankton populations of large oceanic regions. These pelagic stages can be directly affected by low level, long term exposures to small amounts of oil components, as can other planktonic organisms. Since these young stages are generally predatory and feed almost exclusively on other zooplankton organisms, they are also very likely to be excellent candidates for the effects of biological magnification of low level environmental concentrations of contaminants. It thus seems probable that the longer term, somewhat indirect effects of low level oil and other waste contaminants will be far more important and widespread for OCS populations of nektonic organisms than will the direct effects of large spills on adult animals.

The statement is somewhat more accurate with respect to birds and mammals (in fairness I must note that the DES comments on aspects of the following points in section III blc).

However, these animals almost all occupy positions in their respective food chains that are quite high up (they are often third or fourth level predators). Thus, just as has been shown to be the case with respect to DDT (the accumulation of which in the food chain produced catastrophic bad effects on breeding capacities of California brown pelicans), it is probable that the birds and mammals of the southern California OCS will be on the receiving end of greatly magnified concentrations of oil and other contaminants in their food. The effects these exposures, and probable body accumulations, will have are uncertain or unknown. However, they are likely to be seriously deleterious to the well-being of these forms.

Section III E 1 (DES vol. II, pp. 266-268) also reaches a questionable conclusion: "In summary, oil spills present the greatest potential hazard to commercial fish and shellfish." The same points apply here as have just been made. However, the conclusion is all the more curious because the text of the section leading to this conclusion is substantially devoted to a literature summary which largely supports the points I made in the preceding paragraphs of this report.

The DES is inadequate and incomplete in its assessment of possible impacts of OCS development on economically important fisheries resources in southern California. The entire emphasis is on commercial fisheries, with practically no consideration given to recreational fisheries (cf. sections VE and H, vol. II of the DES). The latter differ in major ways from the former and, in southern California OCS waters, are probably even more

valuable than the former. The entire discussion of possible fisheries impacts is strongly influenced by Gulf of Mexico experience. For reasons discussed in my report on invertebrates, this is unlikely to be widely applicable to southern California situations.

The DES is completely silent on possible impacts on the recreational values of the marine bird and mammal resources of the southern California OCS. Both bird and mammal watching are very popular in our area, the mammal watching being primarily centered upon migratory gray whales. In terms of numbers of people involved, time spent, and dollars spent during a year, I suspect that shore and sea bird watching are the largest scale activities.

2) Gaps in the scientific data contained in the subject DES; and

3) Recommendations for studies needed to permit writing of a fully adequate final EIS, with an estimate of how long such studies would take.

Here again this report parallels the accompanying report on invertebrates. For the same reasons cited in the invertebrate report, and with the same recommendation for its inclusion as part of this report, I append a copy of the workshop report on marine vertebrates which resulted from the Southern California Academy of Sciences conference on board the "Queen Mary" in December 1974. This workshop report was written by Professor Kenneth S. Norris from the University of California, Santa Cruz.

I will make two remarks concerning this workshop report:
First, I believe it does not fully adequately emphasize the
need for further work on fishes, especially studies of their
ecological dynamics (see invertebrate workshop report for
parallel studies). Second, I believe it significantly under-
estimates probable dollar costs of the studies outlined.

BLM OCS BASELINE PROGRAM

Recommendations for

Vertebrate Surveys *

Among the most sensitive aspects of the marine environment with regard to impactation by offshore oil drilling, its associated activities and with possible oil spills are the vertebrates, i.e. marine mammals, birds and fishes.

In the southern California bight are major populations of all forms. In fact the area is unquestionably the most important ocean segment on the Pacific coast of continental US with regard to animals. The largest seal, sea lion and sea elephant populations on the Pacific coast occur in the area, including major breeding grounds. Birds and bird breeding grounds are likewise numerous, as are those of reef and benthic fish. Seven species of baleen whales, and 24 species of porpoise and toothed whales occupy the area, and include major populations, breeding grounds and hundreds of thousands of individuals. All major migratory paths of large marine mammals appear to pass through the area.

Also, it is fair to say that public concern about these animals and their treatment at the hand of man is second to none. Kills or injury to porpoises, whales, seals, sea lions, birds or fishes can all be expected to rouse great public indignation. There are also true causes for concern. Birds are particularly susceptible and quickly succumb if wetted

*:by Kenneth S. Norris, Director, Coastal Science Laboratory, University of California, Santa Cruz; Chairman of Workshop on Biological Oceanography (Section on Vertebrates), Southern California Academy of Sciences Conference, Queen Mary Conference Facility, Long Beach, California, December 6, 1974.

with oil. The effect on seals, sea lions, porpoises and whales is harder to assess but nevertheless of concern for several reasons, such as inhalation of oil, concentrations on breeding grounds and so forth. Nearshore fishes, especially, and benthic forms are also susceptible, because their habitat may become a repository for oil. Hence accurate estimates of normal populations and their movements are vitally important.

How may it be achieved? An integrated set of surveys and sampling and tracking efforts is called for. These must be combined with an appropriate data acquisition, interpretation and storage program and with coordination functions with other baseline activities such as oceanographic surveys.

To put this more specifically let us look first at the needs, and second at the means we see for development of a baseline of information.

First, surveys of abundance and distribution are needed. How many animals are there and where do they live? Aerial surveys can be combined for marine mammals and birds and should include a transect survey and regular overflights of pinniped rookeries (seals, sea lions, etc.) and bird colonies. Reef fish must be surveyed by divers to determine indices of diversity and abundance at various critical localities throughout the area of concern. Benthic fish should be sampled probably by trawl and traps.

It was concluded that in the time allotted, no meaningful

additions to information already existing in the records of the California Fish and Game and CalCOFI could be gathered concerning midwater fishes or fish larvae, but instead these long-standing records should themselves constitute a baseline.

Let's look at the individual efforts needed.

Aerial Surveys

A once monthly Gate Line Transect is needed using for safety a twin-engine aircraft (Helios, Skymaster, Supergoose or Bronco preferred) and strut or belly-mounted aerial camera assemblage. This should be run at 10 minutes of latitude intervals from shore to on the average of 100 miles offshore from lat. 32° 30' N to Pt. Concepcion.

These flights should run at days of choice, depending upon weather, and normally should run from 8 AM to about 1 PM because of sun angle and wind.

The aircraft should fly at about 600-800 ft. altitude, should photograph each bird flock, pinniped or cetacean school, record the exact locality using a direct readout radio fix method. When a school or flock is sighted, the plane will deviate for photographs but return to the track line and continue to allow statistical analysis. Three observers should be used; two sighting, one from each side of the aircraft, and one note-taking and providing fixes and serving as a reserve to replace tiring observers.

Observations and photographs should be analyzed and coded

by geographic coordinates for each machine correlation and data retrieval.

It probably will be possible to identify most cetaceans and pinnipeds to species with experienced observers and interpreters. Birds may be identified in some cases to species but more often to genus or families. It should be noted that such data are almost nonexistent for birds.

Data should be broken down as to school or flock size, locality shape (feeding or travelling aggregation, resting or moving group, etc.), time of day and species compositions.

Pinniped and bird surveys require that haul out nesting and rookery grounds be overflowed and photographed regularly. In these cases counts of individual animals will be made and data on groupings within these aggregating animals made insofar as is possible.

Ship Operations

Two rather different sorts of ship operations are needed. First, ground truth (or "water truth") for flights is needed. Cross checks must be obtained concerning (a) species identification from the air, (b) sighting frequency of bird flocks or marine mammal schools, (c) numbers of animals reported, and (d) correlation with marked animals obtained.

The other sort of ship activity that is needed concerns the capture, tagging, stomach analysis, and tracking of animals. Because capture of marine mammals and birds

requires great persistence and cannot be at the beck and call of an overflight schedule, this collecting vessel will have to operate on its own schedule determined by weather and availability of animals. Because any such handling of animals requires approval of the Marine Mammal Commission, the crew will have to be experienced and accredited and will have to operate under an appropriate permit.

This ship will catch, salvage (obtain stomach samples by nonharmful means for food and parasite analysis), freeze brand, place dorsal fin roto tags (which have been tested to nearly 3 years in wild porpoises), and release the animals concerned. Some animals will be equipped with dorsal fin or harnessed radio tags for long-term (to 6 months) radio tracking. These will be chosen from species of special importance to be tracked both by boat and air. Radio tracking allows localization by air over long periods and hence is a uniquely important method. A few such tags will return essential data at many times the rate of visual tags that have to be sighted at sea, since radio tracking by air is possible.

Nonetheless, visual tags are of great importance too! We suggest four kinds; the plastic dorsal fin roto tags for porpoises and whales that are punched in with a pair of special pliers, freeze brand dying for birds and spaghetti tags. Laser branding will be used if available for marine mammals; it is presently in development at the UC Santa Cruz lab. Roto tags may migrate out of a fin, and the loss rate is unknown

to us. To validate tagging and to estimate this rate, each roto-tagged animal will also be freeze branded. Freeze brands scar white and are easily visible, perhaps even by air. In any case freeze brands allow a crosscheck on loss of dorsal fin tags.

Spaghetti tags are long plastic streamers held in place by a dart. These can be placed by hand harpoon or crossbow and allow placement of many tags in a short time.

Both roto tags and spaghetti tags should be color coded by area to allow rapid visual assessment from shipboard of the place of origin.

Such ship work allows assessment of immigration and emigration from the area, and will allow identification of some schools from the air.

Similar tracking of birds from rookeries by radio will allow identifications and location of feeding grounds. Birds should also be dyed in the next to identify source nesting groups and to allow identification at sea.

Data Acquisition & Interpretation

All data must be computer compatible. Data gathering programs should be designed in acquisition and accession to allow retrieval of cross correlations by geographic coordinate, species, time of year, time of day and size of group. Transects should be correlated where possible, with CalCOFI stations.

Citizen Participation

Considerable reservoirs of skillful and interested lay observers exist in the southern California area. While, for marine mammals we recommend the use of highly trained professionals, because security of identifications is often difficult for many species, such groups might be invited to submit plans for work on certain species; for example, they might describe the passage of certain migratory species such as the gray whale, the humpback whale and the killer whale. Similar contributions for the bird program might come from the Audubon Society, who have many members of excellent observational capability

Kelp & Benthic Fish Populations

The evaluation and status of both kelp and benthic fishes is very important. In order to discern subtle changes, long-term surveys are needed, requiring cross correlations of both island and mainland communities. The assessment of benthic communities is particularly important at the proposed drilling sites. The assessment scheme should be designed in such a manner that it is easily integrated with CalCOFI, California Fish and Game and NMFS survey data.

If funds allow, many important questions that require experimental work, especially that dealing with human-related effects upon the food web, are to be encouraged. Much, for example, could be gained by studies of the effects of oil on rookeries, on food webs, and on the behavior and on the physiology of benthic fishes.

Bird Breeding Colony Studies

For each colony, enumeration of nesting birds should be accomplished by aerial censusing of nests or breeding pairs, depending upon the habits of each species. In addition ground based surveys of accessible colonies should be conducted in order to validate aerial censuses. Data gathered prior to the baseline study should be incorporated in order to determine historical trends.

Since reproductive success of colonial seabirds is sensitive to environmental quality, it is essential to measure reproductive success in representative colonies at several times within a breeding season in order to determine the number of young raised per pair and, if reproductive failure is found, to determine at what stage it occurs. This information will be needed, in event of an accident, for separating reproductive failure related to an accident from failure due to pre-existing conditions. Measures of hatching failure, chick mortality, and residues of DDE, PCB and petroleum hydrocarbons should be obtained.

Do sea birds congregate in particular ? To what extent do local breeding stocks intermingle at sea? These questions are all relevant to predicting the effects of seabed exploitation upon reproductive success of local breeding populations and can only be answered through studies of the activities of marked individuals of known colony affinities.

These questions can be approached in two ways. First a number of adult and immature birds can be color-marked at selected breeding colonies. Marks should be highly visible and relatively permanent. Observations of marked birds could be conducted in the course of the regular offshore censusing scheme described above, thereby yielding gross information on concentrations of marked birds and their interactions with other species. Land-based observers should also endeavor to locate marked individuals as they forage close to the breeding islands.

Second, to provide detailed information about movements of breeding birds, one could radio tag and track small numbers of adults of various species in and around the breeding colonies. This is a relatively low-cost technique that could provide detail of the sort that is not usually accessible through the use of visual tags and stationary or shipboard observers due to rapid, long-distance movements of marked subjects. Radio-tagged individuals can be followed over relatively large distances with a minimal investment of ship

and observer time. The location of telemetry subjects can be evaluated by triangulation using one stationary and one shipboard receiver. All necessary telemetry gear is available commercially at present.

Beached Animal Surveys

The collection of beached cetaceans, pinnipeds and seabirds has proven to be an indication of the health of populations. For instance, in the event of an oil spill, the numbers of oiled birds deposited on a beach can be great, and may provide an index of mortality. However, such information is of little validity if there is no information on the "normal" number of animals washed ashore when there is no spill involved. Thus, it is essential to survey on a monthly basis selected stretches of mainland and island shoreline for the enumeration of beached animals.

Causes of death and parasite loads can be approached by sampling such dead animals and is recommended.

Specimen Repository

It is recommended that a central site be identified as a repository for stranding samples, probably the Los Angeles County Museum. In this way important aspects of the baseline may be preserved in case comparison is needed.

Time & Timing

All participants agree that replicated efforts are needed, since all features that will be determined are in some degree

of continual flux. Nonetheless, much can be gained in a single effort. General outlines of distribution and much more precise ideas of numbers than now exist will result.

However, even the roughest idea of variability is of great value and thus we hope that a minimum 3-5 year plan can be contemplated.

Schedules should be arranged to take optimum advantage of breeding periods, especially for birds and pinnipeds.

Several permits will be required, so early designation of contractors and applications are crucial.

Budget

While it is not possible at this time to give precise budgets, estimates are possible.

Marine Mammal Programs

Joint Aerial Surveys	\$250,000
Bird Programs	100,000
Reef Fish Programs	25,000
Citizen Effort	15,000
Sample Repository	15,000
Benthic Fish Survey	<u>100,000</u>
	<u>est. \$605,000/year</u>

ANALYSIS OF THE DRAFT E.I.S. AS IT
RELATES TO MARINE BOTANY

Dr. David J. Chapman

Botany Department
University of California
Los Angeles, California 90024

Analysis of Environmental Draft Statement
DES 74-90 U.S. Dept. of Interior

Prepared for City of Los Angeles
By David J. Chapman

My comments are addressed only to the discussions concerned with marine plants and phytoplankton. The environmental statement has been considered in its entirety, but special consideration has been given to those sections appropriate to Southern California.

STATEMENT ON OVERALL PROPOSAL

One of the most noticeable features is the heavy reliance upon governmental reports, meeting abstracts and survey-type publications for referenced data. These sources are in themselves condensations or synopses of data. This in turn means that this statement is in some respects a condensation of a condensation with all the problems that such an approach brings about. In that section concerned with the Environmental Impacts of the Proposed Action, there was little discussion or consideration of information gained world-wide about oil pollution effects. Admittedly this is concerned only with the U.S. but this other information is applicable. An Environmental Impact Statement should, represent a thorough documentation of the problem and its effects. I do not feel this particular E.I.S. meets this requirement.

Minor errors of fact appear from time to time (e.g. Nannochloris and Stichococcus are not diatoms), but are generally inconsequential. The major concern then becomes the scientific accuracy in interpretation, the critical appraisal, overall and omissions of data in the proposal.

SCIENTIFIC ACCURACY

See earlier comments about minor factual errors.

One criticism I do have is the wording of some of the statements. The red tide description (I-241) could be interpreted to imply respiratory infections, are a major problem. The ecological problems of fish kills, toxin storage and mortality are probably more significant. The storage of dinoflagellate toxins by filter feeders is very significant and practically important and should be noted (see page I-430). There is just not sufficient evidence (see I-242) to imply that red tides may not be natural phenomena. A major concern of phytoplankton blooms is what primes the environment and what triggers the bloom (see later comments). Throughout the E.I.S., discussions on blooms, causes and effects is threadbare and as coastal water phenomena with environmental impact importance I would have hoped for something more substantive. A similar threadbare discussion occurs on I-430.

Other areas of unevenness are provided in the definitions of productivity and the delineation of the near shore and offshore. The discussions on productivity are not completely accurate. It is not strictly correct to describe primary productivity (I-330) as total quantity of protoplasm

produced per unit time; productivity bears some relationship to it. Blanket statements (page I-529) like "comparisons from different years are of little value" can be misinterpreted by the non-scientist. While they may be true, possible underlying factors such as similarity of methodology must also be considered. It is possible if uniform and similar techniques are used that comparisons can have value.

In the section that is concerned with the description of the environment, it would have been far more appropriate to eliminate the distinction between offshore and near shore and coastal zone. Nowhere does there appear to be a precise delineation and in some instances no attempt appears to have been made to abide by the approximations. On I-331 there is a discussion of epiphytic diatoms. Presumably these are near shore diatoms (by virtue of being epiphytic) in which case one would expect the discussion under the section of Near Shore Environment. I would also comment that Cyanophyceae (bluegreen algae) are not really a significant part of the benthic flora. They sometimes are (as a bloom) a significant part of the phytoplankton (e.g. Trichodesmium).

These weaknesses in the E.I.S. result in a definite lowering of the statement's quality and merit. It raises questions in my mind about the scientific expertise and qualifications of the preparer(s) of the report. Or was it a non-scientist just abstracting from available government reports and books?

On Page I-431 the report states "Their (phytoplankton) importance cannot be overstated." This is indisputable and as a result I would have expected a more thorough, uniform and knowledgeable coverage of productivity comparisons, phytoplankton blooms, productivity fluctuations.

The E.I.S. has a serious omission which is inexcusable and I feel must be incorporated. The discussion on attached-benthic (intertidal and subtidal) algae is grossly inadequate. Overall coverage and description of the algal flora is poor (e.g. for the Alaska Pacific region). Most significantly however, there is no mention of Chondrus in the Northeast. This is the basis of a commercial industry. There is no mention (except a few sentences) of the kelp beds (Macrocystis) and the related industry in Southern California. Much time and governmental money has been extended on kelp bed research with a view to maintaining the viability of the industry. To ignore this, (and the possible future industrial use of other algae) is a serious omission that should be corrected. Where algae have been mentioned (e.g. I-713) it has been in an area of general insignificance. The algal flora inhabiting mangrove roots is environmentally less significant than kelp beds or intertidal-subtidal benthic algae.

SCIENTIFIC MERIT

The comments here will be concerned mainly with the sections on the Environmental Impact of the Proposed Action.

I agree with the statements (II-157 ff) that quantification of the environment is poor and this is an essential component of monitoring the environment. They state that their projections (II-159) are based on more recent work. These tend to be primarily qualitative and this should be emphasized since it makes predictions on the extent of potential damage difficult. In my opinion a very real need exists for a thorough quantification of the environment before any leasing or drilling is undertaken. This is an essential prerequisite for any environmental monitoring both on a short term (e.g. major blow out or spill) and long term (cumulative effects) basis. This lack of quantitative base line data is a major problem and the scant coverage given to this by this E.I.S. represents another major criticism.

I would take specific issue with the statement (II-158) -- "No geographic area would have ten million acres - - aside from catastrophic localised spills." Even if one accepts the thesis that the Gulf of Mexico has not been radically altered in 25 years by oil drilling activities it is not valid to use the Gulf of Mexico as an analogue for totally different regions such as Northeast coast, Alaska and Southern California. A comparison of productivity values

Coastal Gulf Alaska	150 gms C/ m ² / year
Southern California	200-400 gms C/ m ² / year
Gulf of Mexico	54 gms C/ m ² / year

and the floral comparisons indicate totally different environments and problems. I cannot accept, on this basis, their statement "---effects would be generally less than those observed in the Gulf of Mexico." Isn't it more a statement of hope?

I would agree that some accomodation and adaptation will occur over time, but the important thing is to what extent and in what way. Again, baseline quantification is needed. I do not question their statement about level of catch in Gulf of Mexico fisheries, but is this due really to an undamaged or adapted ecosystem or due simply to increased sophistication in technique and improved knowledge of fisheries. What fisherman catch over a 25-year period is not my idea of a sound basis of ecosystem quantification and stability (see later quoted comments by Oppenheimer).

In general I find that this whole latter part of the E.I.S. has more a tone of advocacy with a tendency to down play possible harmful effects. The statement should have amplified on the problems of toxicity of drilling mud constituents. Is there for example any possibility of some constituent triggering a phytoplankton bloom. I do not like the statement (II-160) "However, many toxicities are determined in laboratories and field conditions are distinctly different." I agree field and laboratory are different, but well-designed laboratory experiments can be very applicable to field work, especially if the problems of concentration, exposure in-

stability in sea water etc. are considered. Their comment should not be taken to imply that toxicity results cannot be applied to field conditions simply because they were performed in the laboratory.

Page II-161 mentions existing refinery capacity as being sufficient. Is this absolutely the case? I would have expected some discussion of the environmental impact of new refineries. Presumably they are a distinct possibility, and thus their environmental impact should be considered.

In the discussion on phytoplankton there is evidence to suggest that probably spilt oil itself has no permanent or totally lethal effect on phytoplankton. Temporary effects over a year or so in e.g. productivity efficiency may well occur. However, a problem that is significant and should receive more consideration is the effect of emulsifiers and detergents. Research has indicated that these are far more lethal and even in very low concentrations are deleterious to phytoplankton. In the event of a major spill would the company plan to use such compounds in cleanup operations?; would there be legal restraints against their use? This is a consideration that should be covered. The data presented and the problems of interpretation emphasize the lack of, and need for satisfactory baseline data for the environments.

The E.I.S. (II-164) states that no evidence exists for spilled oil entering the marine food chain, yet this is in

contrast to (e.g.) Blumer's statements referred to on Page 167. I would agree - in principal - with the comments that phytoplankton may not be seriously impaired by a major spill. Although they have mentioned it, this viewpoint should be strongly tempered by considerations of where the spill will occur, it's size, natural dispersion, mechanical dispersion (e.g. emulsifiers). It is true that the rapidity of phytoplankton multiplication and the continual "movement" of the oceanic environment would probably bring about replacement of the population within a year or so. But what about the long term cumulative effect, and in this regard I would refer back to Blumer's comment on II-167 with regard to the comments of Oppenheimer, St. Amant and Jones (167 ff) I would just emphasize again that there must be a distinction between long term effects (about which we know little) and short term effects resulting from one shot catastrophic spills about which we do know something).

There is a tendency in this statement to relate "lack of evidence" to paucity of results. One must distinguish between lack of evidence caused by paucity of results and investigations and lack of evidence caused by paucity of results and investigations and lack of evidence caused by the failure of results and experiments to indicate. In an overall consideration it would appear that coastal lands (marshes, swamps) are far more fragile and susceptible than the phytoplankton. With regard to Southern California the wetlands are a lesser consideration than in the Gulf of Mexico and Southeastern United States.

The other tendency, which I again caution against is the use of results and observations from the Gulf of Mexico as to predict for other areas. The Gulf of Mexico is quite different from the other areas, such as Southern California.

OMISSIONS

This section refers to aspects that are missing from the statement and that I feel should have been incorporated.

The most obvious, and most serious, is the paucity of coverage given to the attached algae. This is particularly important when it is realised that this involves commercial industry in the Northeast and Southern California. This is a serious weakness of the E.I.S.

There is unevenness in coverage of the phytoplankton, particularly in the realm of productivity and phytoplankton blooms.

I also feel the overall quality and depth of the proposal would have been enhanced by reference to work outside the Americas, but which is appropriate to general pollution.

I would also have expected a "what if" consideration. There is no consideration of how O.C.S. oil spills might be handled. This is critical in assessing the possible effects, especially with regard to possible use of emulsifiers and detergents.

WHAT IS NEEDED

It is quite obvious that a thorough baseline quantification of the environment is needed, before any drilling

is undertaken. This is a sine qua non for monitoring the environment and possible changes. The E.I.S. in one section mentions a two year time span. I think three is minimal, in order to give time to cover two growth cycles and observe normal fluctuation.

There should be some consideration and estimation of the economic consequences of possible disruption of, for example, kelp beds, abalone fishery (by disruption of algal beds), disruption of marshland - wetland reclamation.

A concerted effort is needed to build up a basic body of knowledge about side effects of oil operations (e.g. effect of drilling muds) on phytoplankton. This is significant for areas of high productivity. This statement is made with particular reference to the implication that what has or has not happened in the Gulf of Mexico will be applicable to other areas.

SUMMARY (As applied to Algae and Phytoplankton)

Overall the statement is comprehensive with no major factual errors. There are some major and serious deficiencies. These have been referred to. The statement is however characterized by a lack of uniformity or evenness in depth and quality of coverage. An E.I.S. statement should be a critically prepared document, and this I feel is a weakness of this one. I wonder if this is not the result of the training and level of expertise of the preparer and

and the method of preparation.

Although one does not pass on the acceptability or otherwise of this E.I.S. I would if asked, rate this E.I.S. as marginally acceptable for reasons given above.

CHEMICAL OCEANOGRAPHY

Dr. I. R. Kaplan

Professor of Geology and Geochemistry
Department of Geology and Institute of
Geophysics and Planetary Physics
University of California
Los Angeles, California 90024

BLM DRAFT ENVIRONMENTAL STATEMENT

CRITIQUE ON SECTIONS DEALING WITH S. CALIFORNIA

Evaluation of Accuracy Concerning Statements on Chemistry

The EIS appears to give a relatively accurate description of the environmental factors controlling air and water quality in the Southern California environment. The discussion is, however, very brief and selective. Only two pages are devoted to S. California, 1½ to central California and 4½ to the San Francisco Bay area. No attempt has been made to describe background levels of nutrient content or base metal concentrations in the coastal waters. There is virtually no reference to the distribution pattern of petroleum hydrocarbons in coastal waters. No attempt has been made to discuss the chemistry of the sediment which may affect the bottom-dwelling organisms.

Specific examples were chosen to indicate that adverse effects on the marine plant or animal communities can result from industrial and social activities presently operational along the coast. No attempt was made to discuss the operational hazards associated with offshore drilling in the Santa Barbara Channel.

On pages 260-267, an attempt was made to describe the hazards resulting from increased production, refining and accidental spill of petroleum. Values are given for average waste discharge contents of toxic gases, salts, hydrocarbons or solids. No attempt was made to estimate the total mass of effluents which may be released during normal operations.

Because the document is very brief, its treatment of factors concerning quality of the environment are somewhat superficial. However, there does not appear to be any attempt to mislead or to misrepresent the facts.

State of Present Knowledge Concerning Chemistry of Water and Sediment on Southern California OCS

A great deal of work has been undertaken on the distribution of nutrients, salinity and oxygen in the waters along much of the shelf. The data has been collected by the Hancock Foundation, USC from 1950, and more recently by combined efforts of Scripps Institution of Oceanography and the National Marine Fisheries Service, Southwest Fisheries Center. Most of the studies have been made to depths of about 500 meters and the data obtained are mainly used for hydrographic interpretations of the characteristics of the water column. The data is also useful for interpretation of current movement and identification of water masses.

Some studies of a random nature have also been made on the trace metal content of coastal waters. In general, only waters within the channel islands along shipping routes, within harbors and at the outlets of sewage outfall pipes show significant deviation from normal deep-sea water characteristics.

Work has been undertaken on the distribution of heavy metals in the fine-grained sediment of the coastal shelf basins,

especially the near-shore basins, and along the entire coast. A detailed study on trace metals and total hydrocarbons has been conducted by USC on the sediment of the Los Angeles Harbor, and was expanded out to Santa Catalina Island. Probably the most comprehensive studies on chemical pollutants are being undertaken adjacent to the sewage outfalls extending from Ventura to San Diego counties under the direct participation of the Southern California Coastal Water Research Project.

Virtually no recent work has been undertaken on the distribution of petroleum hydrocarbons in either the water column, the sediment or the organisms. Some studies were performed about 15 years ago on hydrocarbon distribution in fine-grained sediment from a few basins. More recently, studies have been made by USC on seeps and sediment adjacent to the Santa Barbara Channel operations.

Our knowledge of the distribution and controls of pollutants on the OCS is very poorly understood at this time, through lack of data.

Baseline Information Which Needs To Be Gathered

From the foregoing discussion, it is obvious that a great deal needs to be known about the chemical conditions of the OCS prior to monitoring for changes which may occur as a result of exploration and production.

First, it is necessary to obtain a good understanding of the natural distribution of hydrocarbons both in fine-

grained and coarse-grained surface sediment. This should be obtained for both oxidizing and reducing conditions, to determine whether exposure to oxygen causes recognizable changes.

Second, background studies on hydrocarbon distribution in the water column should be made at least on a grid of 100 square miles at 4 or 5 depths.

Third, two or three representatives of dominant genera of bottom-dwelling animals, fish and zooplankton should be analysed to determine the level and nature of their hydrocarbon contents.

Fourth, a detailed investigation should be undertaken to identify the natural oil and gas seeps on the S. California borderland and to determine their characteristics using a large variety of parameters. It may ultimately become necessary to resolve whether oil slicks have resulted from natural causes or from spills during production.

Fifth, certain trace elements, particularly radioactive elements related to the uranium series, such as lead-210 and radon, may be extremely useful in allowing for evaluation of sediment movement and rates of accumulation. They may also allow a determination of which sediments are stagnant and have no animal life in them and which are being reworked by burrowing organisms.

Sixth, an experimental program should be launched to determine the toxic effect of petroleum on local animals and plants. In particular, it would be important to determine

the organs which are most affected and the threshold concentration factors which are necessary to affect any toxicity.

Last, some studies need to be undertaken to determine the degradation pathways of petroleum. What fraction is evaporated and how long does it persist in the atmosphere? An important question is whether aged petroleum in seawater becomes more or less toxic to organisms. It would also be of value to estimate what proportion of the hydrocarbon is biologically degraded and what proportion is removed by atmospheric interaction. Such studies need to be done locally, as toxicity levels and biodegradability depend on the chemical nature of a particular petroleum.

Special Problems Associated With Petroleum Exploration on the OCS

(1) Operational pollution effects

During exploration and production, pollution will occur primarily through four sources.

(a) Drilling mud released from drilling platforms which will reduce optical transparency of the water and may form a dense layer overlying the natural sediment surface. In such a circumstance, anoxic conditions may be established in the sediment causing production of hydrogen sulfide and elimination of benthonic animals. This should only cause local disturbance.

(b) Crude petroleum released from drilling mud and other drilling procedures. The amounts here are probably very

low and would not constitute any appreciable hazard, especially in deep water far from shore.

(c) Waste gasoline and exhaust fumes may be expected from normal traffic of launches, tugs and other service vessels. Much of these waste products will be volatile and will only have a short duration in the sea.

(d) Heavy metals will be released from drilling rigs, formation water, crude oil and gasoline. Probably the most hazardous will be lead, which might be relatively soluble in saline water. Vanadium and nickel contents might also represent a hazard, which will have to be evaluated.

(2) Accidental spill

Probably the greatest danger to OCS operations will come from a single large spill. The reason for this, is that the petroleum could form an impermeable layer on the ocean surface preventing exchange of gases with the atmosphere and also absorbing visible light. It should be recognized, however, that for many reasons, the OCS of southern California is a relatively safe area in some respects, but potentially vulnerable to an oil spill in others.

First, the north-to-south-moving California current would tend to move the surface oil film away from the coast.

Second, because of topographic features of the shelf, areas overlying banks are subjected to relatively swift

bottom currents and substantial swells. Hence, water movement would accelerate dispersal and oxidation of the oil.

However, the topography also introduces a potential for damage in two environments. One is the coast along the channel islands which could be exposed to oil. Intertidal pools, nesting grounds, etc. could be endangered. Second, there are numerous basins within the shelf where water movement is very slow, and the oxygen content of water is greatly reduced. If petroleum does settle there, it may cause further removal of oxygen and create temporary stagnant conditions. The biota in these basins is probably not as rich as on banks and platforms and damage would probably not be significant.

(3) Longevity of pollution effects

The longevity of an oil spill cannot be estimated theoretically. Because petroleum degradation is controlled by both biological and non-biological processes, it will depend on the following environmental conditions. Roughness of sea and wind velocity, temperature of sea surface, nutrient content of surface waters, particulate content of water column and chemical nature of the crude oil. Small spills may be dispersed in a matter of hours in the open sea.

Probably the greatest danger comes from oil being washed on beaches at high tide and smeared along an entire beach front. Oil slicks are frequently formed from sudden

releases of natural seeps between Ventura and Santa Barbara. One such slick which drew public attention in October, 1974 was virtually unnoticeable within two days and only left small tar residues on the beaches. The effects of the 1969 Santa Barbara catastrophe had essentially disappeared from the beaches one year after the accident.

(4) Effects of dispersing agents

Probably the most controversial aspect of combating oil spills is the effect of detergents or dispersing agents. The classical case most frequently quoted by opponents of using chemical agents, is that of the Torrey Canyon accident off Cornwall, England in 1967. It was found here that the biological effect of the detergents was more detrimental than the effect of the oil. Proponents, however, believe this was due to use of polyaromatic-type substances in the dispersants. This lobby believes that use of aliphatic fatty acid or alcohol derivatives, which are biodegradable, offers a great advantage to increasing rate of oxidation of oil as well as acting as non-wetting agents. The opponents counter that dispersing petroleum increases its solubility in seawater, and hence increases its probability of entering the metabolic pathway of zooplankton and filtering organisms, hence causing it to be more hazardous. This question should be resolved quickly.

Summary of Hazard to Quality of Sea and Air by Oil in OCS Operation

It is without question that any industrial operation on

the OCS offers a potentially destructive hazard.

Because of the nature of the S. California environment, the greatest danger might come from an accidental spill or blowout which could affect the biota along the coastal regions of the channel islands. Such accidents would probably have little effect on the environment along the mainland, unless an uncontrollable blowout would persist for several days or weeks.

During the baseline study to be undertaken by the BLM on the OCS, work on the channel island shoreline should not be neglected. Contingency plans should also be established for rapid oil removal, both from the seawater surface and from the coastline. It would seem that with the experience already gained, and the time still available for planning and investigation, risks emanating from petroleum production on the OCS can be kept within tolerable bounds.

SEISMIC PROBLEMS

Dr. Tom L. Henyey
Assistant Professor
Geophysics Department
University of Southern California

REGIONAL SEISMICITY
OF SOUTHERN CALIFORNIA AND ITS OFFSHORE
AS RELATED TO
DEVELOPMENT OF OIL AND GAS ON THE OUTER CONTINENTAL SHELF

I. Introduction

The coastal zone of southern California is part of a much larger seismic province, consisting of northwestern Mexico and most of California, dominated by the active San Andreas fault system. Most of the seismicity of this region is directly related to, and consistent with, the regional stress pattern responsible for this important fault. A detailed analysis of active faulting and the associated seismicity should be a primary concern for oil and gas development of the outer continental shelf.

A. For the purpose of the following discussion it is necessary to define the phrase "active fault". Two classes of active faults have been defined by Jennings (1973).

1. Those faults which have displaced Pleistocene or Recent geologic units (less than 2 m. y. old)
2. Those faults which have historically broken the surface along the fault trace, either during a seismic event or by creep. This type of fault logically must be considered potentially more hazardous.

A third type of active fault should also be recognized; that which exhibits microseismicity or an alignment of epicenters along the fault trace. Such epicentral alignments may be along faults which have not broken during historic time but which may have periodicities between destructive events on the order of hundreds of years and can thus be considered only slightly less hazardous than the Type 2 events of Jennings.

For the purpose of recognizing active faults in the offshore region, the following subdivisions of the Type 1 faults of Jennings may prove useful:

1. Active during the last 10,000 years as evidenced by offset of the most recent sediments
2. Active during the last 2 m. y. Either the most recent sediments are not offset or this evidence is lacking.

Thus the word active in this discussion will refer to both the Type 1 and Type 2 faults of Jennings, as well as those which exhibit seismicity.

B. In principle, two aspects of seismicity must be considered:

1. A possible causal relationship between resource exploitation (drilling, withdraw by repressuring, etc.) and induced or accelerated seismic activity, and,
2. Hazards to structures, the environment and human welfare resulting from resource exploitation in a naturally seismic region.

The following discussion addresses these points, evaluates the existing draft environmental impact report and finally suggests additional studies needed.

II. Possible Seismic Hazard Resulting from Resource Exploitation

Causal relationships between oil field operations and seismicity are poorly understood. An analysis of the problem can be made by examining the historic record in California and reviewing the relatively few case studies.

A. There are two methods by which oil field operations could conceivably cause seismic events:

1. By inducing local stresses in the subsurface which are in turn relieved along local fractures. These events should not be too energetic since the energy budget as determined by the field activities is relatively small.
2. By causing existing local or regional stresses to be relieved along local faults.

Most of the major oil fields in southern California are associated with major faults, many recognized as active. During the fifty years of oil field operations in southern California no potentially destructive earthquake has been known to result from these operations. However, ground subsidence, sometimes along fault strands, and resultant minor earth tremors (Kovach, 1974) are known to result from fluid withdrawal. Thus it appears that method (1) above has been realized, but not method (2).

Studies by Teng, et al. (1972) also suggest that oil field operations in southern California have a negligible effect on seismicity. Healy, et al (1972) have shown that fluid repressuring of the subsurface can induce small earthquakes along pre-existing fracture zones in a hard rock medium under existing tectonic stress. The effect is attributed to the frictional decoupling across the fractures by increased fluid pore pressure. This method seems to be the most

likely mechanism for relieving existing tectonic stress. It is important to realize, however, that in a dynamic stress regime such as exists in southern California, these stresses would ultimately be released. Man's influence could only speed up the processes (perhaps beneficially by not permitting stresses to reach hazardous levels) or shift the zone of actual faulting.

Finally, most of the oil field operations are taking place in the "soft" sediments above the basement. The sediments may be largely decoupled from the stressed basement below and hence may be largely stress free.

In short, the likelihood of oil field operations causing an adverse seismic effect in the southern California area must be considered small.

III. Evaluation of Seismic Hazards Pertinent to Platform Construction and Development on the Outer Continental Shelf.

The principal seismic concern to outer continental shelf development is the hazard to structures, pipelines, etc., and the indirect hazard to the marine environment and coastal regions, resulting from severe ground shaking or ground breakage from a major natural-occurring earthquake. A secondary concern involves the carrying out of certain types of oil field operations (such as repressuring) in the presence of faults; in this regard fault zones must be considered as potential conduits from subsurface to surface.

A. Proximity to faults

The proximity of structures to active faults is of fundamental concern. Platforms should not sit astride, or drill holes should not intersect active faults. Pipe lines crossing active fault traces must be suitably designed. Repressuring operations and tapping of high pressure subsurface horizons should be considered vis-a-vis proximity to faults--active or inactive. The degree of shaking (acceleration) is strongly related to distance from epicenter

B. Recurrence intervals

Recurrence intervals for maximum likely earthquakes on influential faults can be determined from the coastal zone and borderland seismicity. An example of a recurrence relation is shown in Figure 2 as determined from the seismicity of the region containing the west L.A. basin, Santa Monica and San Pedro basins. Facilities should be designed for the maximum event with a reasonable probability during facility lifetime. For example, from Figure 1, a magnitude 6 to 7 event should be considered as reasonably certain over the next 100 years for the region given above. Recurrence

relations can be derived for specific regions (Figure 2) or individual faults. A magnitude 8.0 to 8.5 event is considered reasonably certain for the southern San Andreas fault in the next 50 to 100 years. Such a large event, although centered perhaps 50 km inland will have significant effects offshore of southern California.

In short, recurrence intervals for potentially destructive earthquakes affecting a particular location on the outer continental shelf may be anywhere from 50 to several hundred years.

C. Acceleration factors

Acceleration factors should be evaluated for all of the important events considered under (B) above. There are two methods by which accelerations can be assessed.

1. Maximum acceleration attained during the course of shaking irrespective of frequency content. This method is often useful for small structures such as houses since the dominant frequency of shaking is often equivalent to the structures response. However, as an example, for platforms, although peak acceleration can still provide useful information, it may not predict the specific response. Peak accelerations for "hard rock" sites (Figure 2) have been determined for different sized earthquakes as a function of distance by Schnabel and Seed (1973). It is important to note that for specific sites, peak accelerations could attain 1 g in the O.C.S.
2. The determination from accelerograph data of the Response on Fourier spectrum for a given earthquake. This method considers ground motions in terms of frequency content of the incoming seismic signal. Determination of Fourier or Response spectra are necessary to predict the behavior of large or complex structures. Spectra such as these are also available for typical earthquakes, although they are much more likely to be dependent on local geologic conditions.

D. Substrate character

The offshore region of southern California consists of a series of basins and ridges. The basins contain thick sections of unconsolidated muds and silts presumably overlying Tertiary sediments. The ridges are often devoid of unconsolidated materials, although

Figure 1

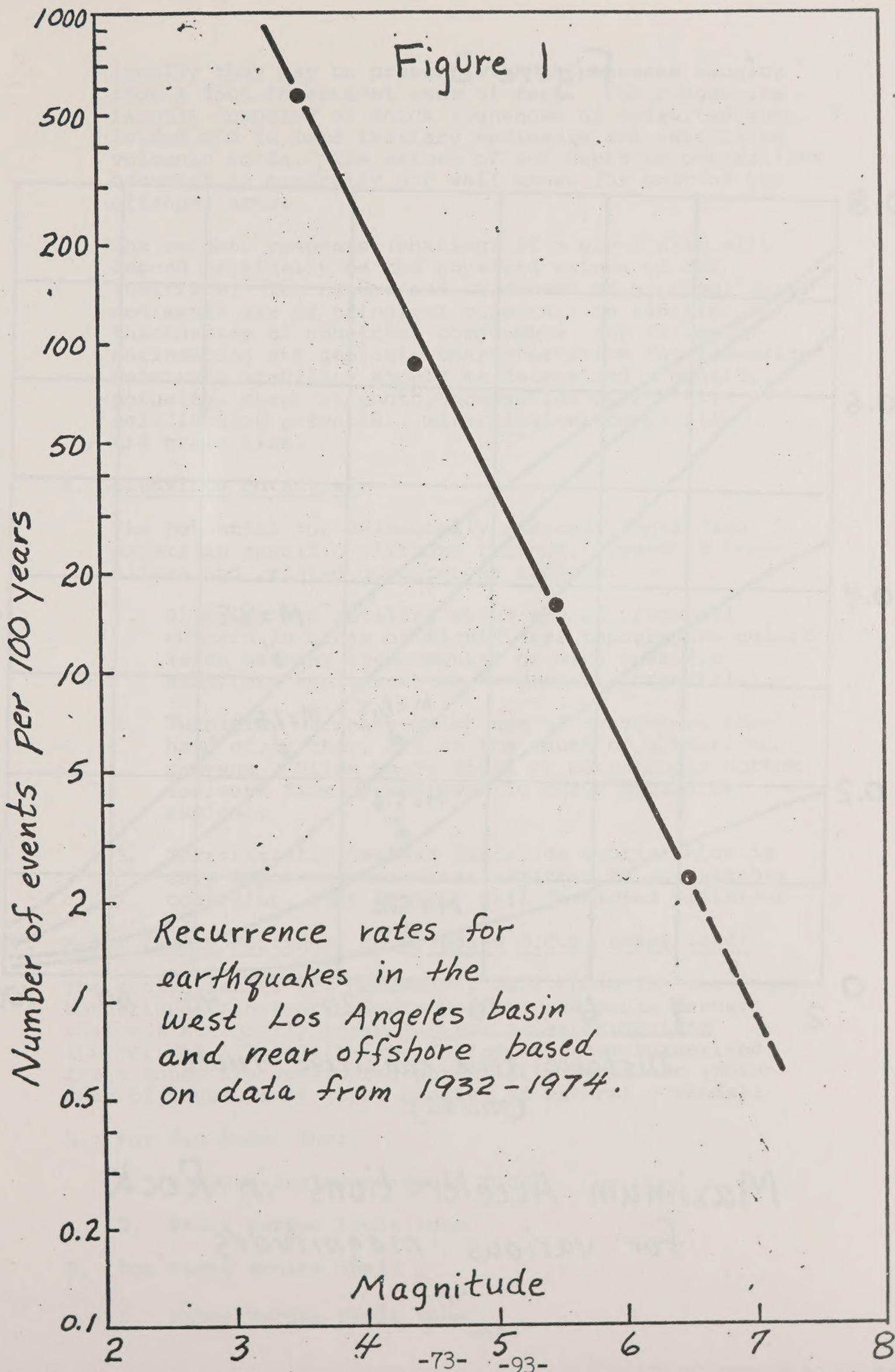
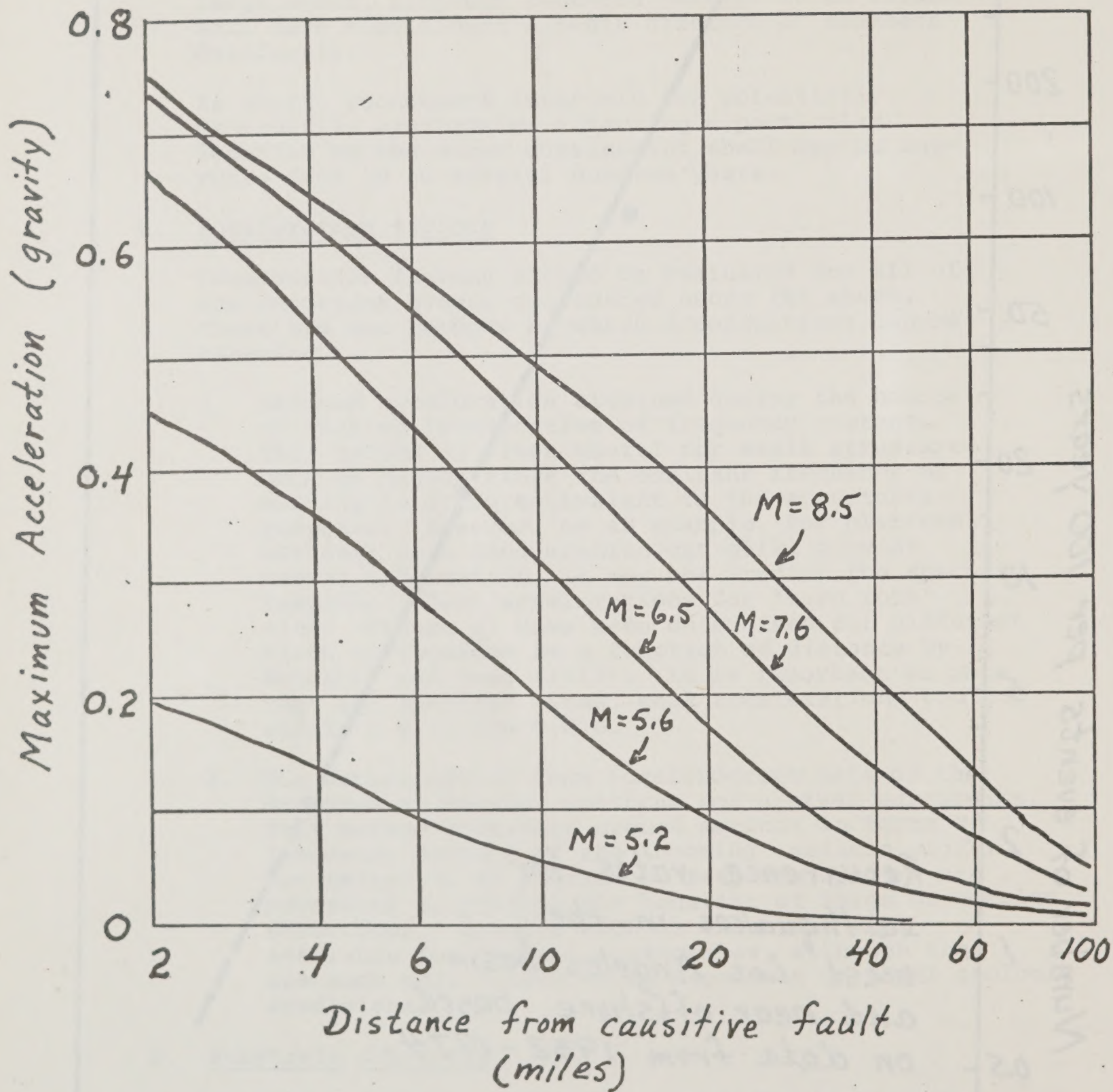


Figure 2



Maximum Accelerations in Rock
for various magnitudes

locally they may be present with thicknesses ranging from a foot to several tens of feet. The ridges are largely composed of thick sequences of upfaulted and folded mid to late Tertiary sediments and associated volcanic rocks. The nature of and depth to crystalline basement is generally not well known for most of the offshore area.

The seismic response (shaking) of a given site will depend critically on the physical nature of the substrate. The nature and thickness of unconsolidated sediments are of principal concern. In addition to thicknesses of substrate components, the following engineering and geologic characteristics for assessing substrate stability should be determined: density, porosity, shear strength, compaction potential, solifluction potential, mineralogical composition, and grain size.

E. Landslide Potential

The potential for seismically induced landsliding exists in specific offshore regions. Types of landslides and related occurrences include:

1. Slumping and settling which are of principal concern in areas of significant topographic relief (such as near escarpments) or with specific substrate type (such as compactable materials).
2. Turbidity currents which are of concern at the head of, within, and at the mouth of submarine canyons. Sites where rapid or catastrophic bottom sediment flow is observed to occur should be avoided.
3. Terrestrially derived landslide debris which is only important for sites adjacent to an unstable coastline, such as near well developed palisades.

IV. Major Faults Pertinent to Proposed O.C.S. Lease Lands

The active faults are moderately well known for the inner borderland (San Pedro, Santa Monica, and Santa Barbara shelves) but poorly known for the outer borderland (Ziony, et al. 1974). The following inner borderland fault zones are considered potentially hazardous (note: most of these fault zones consist of several strands):

A. For San Pedro Shelf

1. Newport-Inglewood Fault Zone
2. Palos Verdes Fault Zone

B. For Santa Monica Shelf

1. Palos Verdes Fault Zone

2. Santa Monica-Malibu Coast Fault Zone

C. For Santa Barbara Shelf and Northern Santa Rosa-Cortes Ridge

1. Santa Rosa Fault
2. Santa Cruz Fault
3. Santa Ynez Fault
4. Arroyo Parid Fault
5. A group of E W trending unnamed faults in Santa Barbara channel (Jennings, 1974)

Many faults have been postulated by Moore (1969) for the outer borderland, but their activity has not been documented. Moore suggests that most of the escarpments in the outer borderland are fault controlled.

The San Clemente escarpment--Aqua Blanca Fault trend is recognized as the most important seismically active zone in the outer borderland.

Noteworthy is the fact that faults south of the channel islands are NW-SE trending and probably involve right-lateral strike-slip and/or normal components of displacement while faults within the Channel islands and to the north involve left-lateral strike-slip and/or reverse components of displacement. Unpublished data on active faults in the offshore regions are available from the U.S.G.S. and U.S.C.

V. Seismicity of the Borderland

The general level of seismicity in the inner borderland does not appear to be appreciably different from the near-coastal onshore regions (U.S.G.S., Caltech, U.S.C. seismic station data). Damaging earthquakes have occurred offshore near the coast; these include the 1925 Santa Barbara and the 1933 Long Beach earthquakes. The seismicity, however, does appear to diminish with distance from the coast. This trend is poorly defined due to paucity of data.

Finally, the hypocentral depths for earthquakes in the borderland are not well established due to a combination of poor station control and lack of detailed subsurface seismic velocities. This information is useful in assessing the relationship between subsurface stresses and ground movements resulting from fluid injection-withdrawal. Hypocentral depths in the borderland probably occur between 5 and 15 km.

VI. Earthquake Risk

The risk to a particular structure due to a given earthquake is a function of that structures engineering design vis-a-vis its proximity to the earthquake epicenter. Thus risk can be mitigated by appropriate siting (within the limits of development objective) as well as by appropriate structural design. Substrate failure involves more difficult (if not impossible) engineering design than ground shaking. Suitable structure can probably be designed to withstand the strongest expected ground accelerations (~ 1 g).

VII. Critique of Draft Environmental Statement Discussion on Earthquake Hazard.

The portion of the E.I.S. pertinent to seismic hazard is contained in Section 3 (Pacific Region); subsection (a.) (Geology); subsection (1) (Southern California and Santa Barbara O.C.S.)--pages 356-382. In short, an adequate discussion of earthquake hazard on the O.C.S. is lacking. Specific comments are as follows:

- A. P. 356 - It should be noted that basins and ridges are probably both fault and fold controlled. It might be worth evaluating hypotheses of borderland development - different styles of tectonism are suggested by several authors (Yeats, et.al. 1974; Howell, et.al. 1974, etc.)
2. P. 365 - The important near shore faults (Palos Verdes, Santa Monica, Malibu, Newport-Inglewood) have been neglected as has the apparent decrease in seismicity from inner to outer borderland.
- C. P. 370 - The word "active" should be defined
- D. P. 370 - The sentences beginning "The present state-of-the-art . . . " should read:

The present state-of-the-art is such that most active faults can be identified and accurately located through detailed geologic mapping, seismic reflection profiling, seismic monitoring, trenching and drilling. Although this work may be expensive, it is necessary to guide development so that losses due to fault displacement on active faults can be virtually eliminated.

- E. P. 370 - Effects of ground shaking have been neglected.
- F. Fig. 54 (and p. 370 "Earthquakes") is a bit misleading and probably should be omitted. It is probably not accurate especially for O.C.S. - certainly not accurate on a small scale. This is a poor way to depict earthquake risk. A regional seismicity map would be one step better.

G. A figure showing "active" faults has been omitted.

III. Suggestions for Proposed Studies

A. High resolution (3.5 kHz) and high energy (sparker, air gun) reflection profiling should be carried out at 1 km grid spacing on lease lands and along nearby suggested fault trends to determine geologic "activity". This work should be integrated with existing data from commercial sources, U.S.G.S., U.S.C., etc.

B. Seismicity of Borderland

The number of land based stations cannot be made sufficient to examine detailed seismicity. Ocean Bottom Seismometers (OBS) are needed for control on both epicenters and hypocenters, as well as fault mechanism. A minimum of 6 OBS should be used to monitor lease regions for a minimum period of 3 to 6 months per region. Stations should be established on all islands (in some cases more than one per island).

C. Ocean Bottom accelerometers should be immediately placed at prospective (or typical) platform sites.

D. Vibracore or rotary drill samples of substrate at prospective (or typical) platform sites should be taken as soon as possible for substrate properties analyses. This work should be supplemented with detailed 3.5 kHz high resolution seismic profiling.

SELECTED REFERENCES

- Algermissen, S. T., 1969, Seismic risk studies in the United States: Proceedings of the Fourth World Conference in Earthquake Engineering, Santiago, Chile.
- Allen, C. R., J. Hileman, and J. M. Nordquist, 1974, Catalog of southern California earthquakes between 1932 and 1972: California Institute of Technology, special publication.
- Allen, C. R., P. St. Amand, C. F. Richter, and J. M. Nordquist, 1965, Relationship between seismicity and geologic structure in the southern California region: Seis. Soc. Am. Bull, 55, 753-797.
- Barrows, A. G., 1974, A review of the geology and earthquake history of the Newport-Inglewood structural zone, southern California: Calif. Div. Mines and Geology.
- Crowell, J. E., 1974, Origin of late Cenozoic basins in southern California, in Dickinson, W. R., ed., Tectonics and sedimentation: Soc. Econ. Paleontologists and Mineralogists Spec. Pub. 22, 190-204.
- Fischer, P. J. and R. Berry, 1973, Environmental hazards of the Santa Barbara Channel: Oil and gas seeps and Holocene faulting, in Geology, seismicity, and environmental impact: Assoc. Eng. Geologists, Spec. Pub.
- Hamilton, R. M., R. F. Yerkes, R. D. Brown, Jr., R. O. Burford, and J. M. DeNoyer, 1969, Seismicity and associated effects, Santa Barbara region: U. S. Geol. Survey, Prof. Paper 679, 47-77.
- Healy, J. H., W. H. K. Lee, L. C. Pakiser, C. B. Raleigh, and M. D. Wood, 1972, Prospect for earthquake prediction and control: Tectonophysics, 14, 319-332.
- Housner, G. W., 1970, Strong ground motion, in Earthquake Engineering, R. L. Wiegel, ed., Prentice-Hall, p. 75.
- Housner, G. W. and M. D. Trifunac, 1967, Analysis of accelerograms-- Parkfield earthquake: Seis. Soc. Am. Bull., 57, 1193-1220.
- Howell, D. E., C. J. Stuart, J. P. Platt, and D. J. Hill, 1974, Possible strike-slip faulting in the southern California borderland: Geology, 2, 93-98.
- Jennings, C. W., 1973, State of California preliminary fault and geologic map: Calif. Div. Mines and Geology, Prelim. Report 13.
- Kovach, R. L., 1974, Source mechanisms for Wilmington Oil Field's, California, subsidence earthquakes: Seis. Soc. Am. Bull., 64, 699-711.
- Moore, D. G., 1969, Reflection profiling studies of the California continental borderland: Structure and Quaternary turbidites basins: Geol. Soc. Amer., Spec. Paper 107, 142 p.

- Platt, J. P. and C. J. Stuart, 1974, Newport-Inglewood fault zone, Los Angeles basin, California: Discussion: Am. Assoc. Petroleum Geologists Bull., 58, 877-898.
- Schnabel, P. B. and H. B. Seed, 1973, Accelerations in rock for earthquakes in the western United States: Seis. Soc. Am. Bull., 63, 501-516.
- Teng, T. L. and C. R. Real, 1972, Microearthquake monitoring in the Los Angeles area: USC Geophysical Laboratory Technical Report 72-1, 50 p.
- Teng, T. L. and T. L. Henyey, 1974, Microearthquake monitoring and tectonic interpretation of the Los Angeles basin area: USC Geophysical Laboratory Technical Report 74-3, 27 p.
- Vedder, J. G., H. C. Wagner, and J. E. Schoellhammer, 1969, Geologic framework of the Santa Barbara Channel region: U. S. Geol. Survey Prof. Paper 679A, 1-11.
- Vedder, J. G., L. A. Beyer, A. Junger, G. W. Moore, A. E. Roberts, J. C. Taylor, and H. C. Wagner, 1974, Preliminary report on the geology of the continental borderland of southern California: U. S. Geol. Survey Map MF-624.
- Wiegel, R. L., ed., Earthquake Engineering: Prentice-Hall, New Jersey.
- Yeats, R. W., M. R. Cole, W. R. Merschot, and R. M. Parsley, 1974, Poway fan and submarine cone and rifting of the inner southern California borderland: Geol. Soc. Amer. Bull., 85, 293-302.
- Ziony, J. I., C. M. Wentworth, J. M. Buchanan-Banks, and H. C. Wagner, Preliminary map showing recency of faulting in coastal southern California: U. S. Geol. Survey Map MF-585.

SEISMIC PROBLEMS RELATED TO O.C.S. DEVELOPMENT

Dr. Robert L. Kovach

Professor of Geophysics
Stanford University

EARTHQUAKE DAMAGE IN OIL FIELD OPERATIONS

The removal of large volumes of fluid in California reservoirs has led to differential subsidence, earthquakes and fault movement in many California oil fields (Yerkes and Castle, 1969). The most notable example of subsidence triggered earth movements occurred in the Wilmington oil field in 1947, 1949, 1951, 1955, and 1961 (Kovach, 1974).

Earthquakes have also damaged producing wells in the Rosecrans oil field (Martner, 1948) and the Dominguez oil field (Bravinder, 1942). The Arvin-Tehachapi shock of 1952 produced broken pipelines and a number of casing failures (Johnston, 1955). Since a small amount of fault displacement can cause a casing break or a broken pipeline the future possibility of similar occurrences offshore cannot be completely dismissed. One cannot also overlook the possibility that if high subsurface pressures were released to the surrounding rocks in near ocean bottom reservoirs through fault movements or slippage and fractures formed to the sea floor an oil leak could develop.

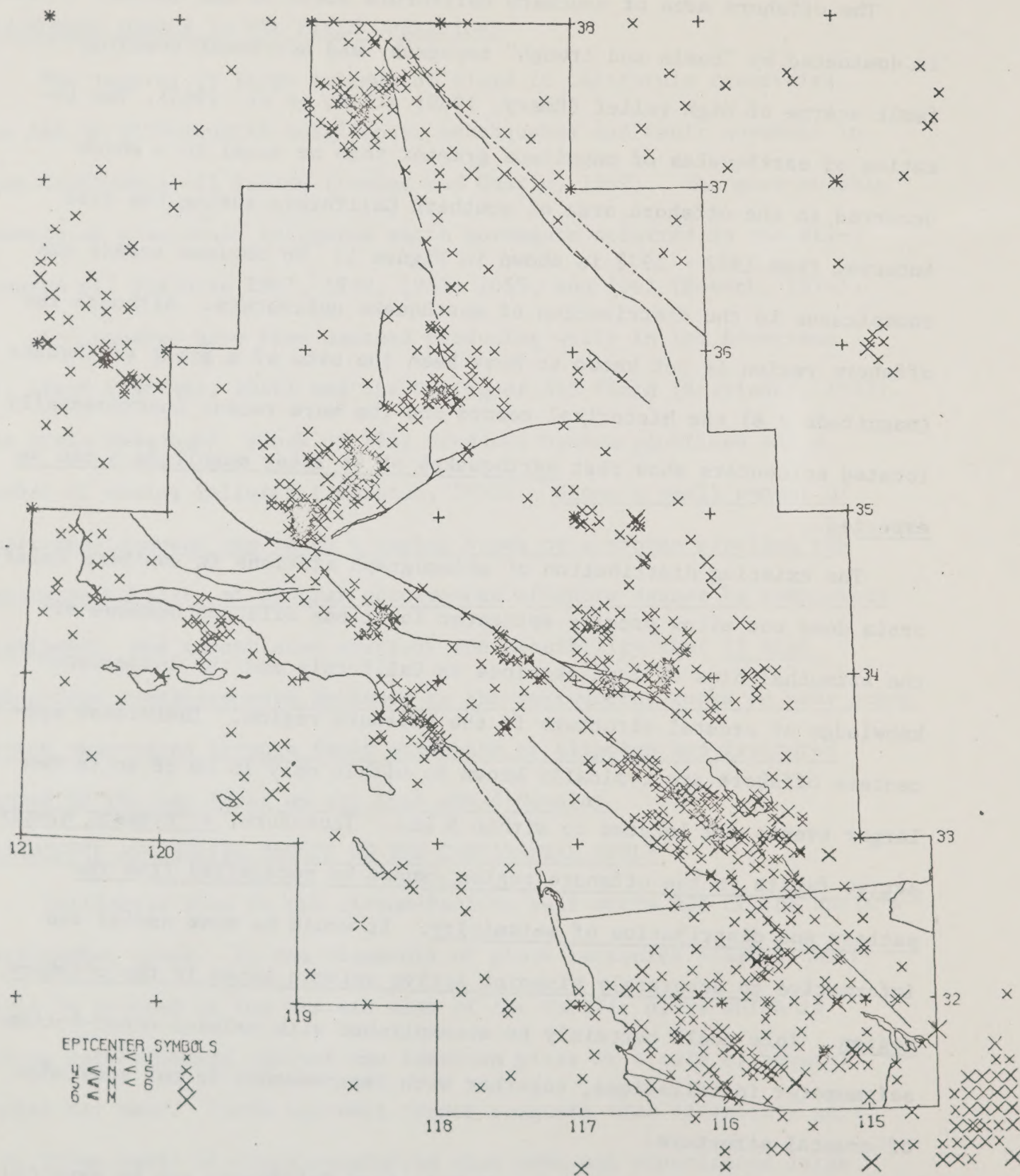
SEISMICITY AND ACTIVE FAULTS OF THE CONTINENTAL SHELF

California lies in the circum-Pacific belt where 90% of the world's earthquakes occur. In the framework of plate tectonics coastal California is located at the eastern edge of the Pacific plate which is moving northwestward against the American plate at a rate of several inches per year. Plate tectonic theory suggests that seismicity gaps, i.e. those parts of plate boundaries that have not experienced large earthquakes during the past tens to hundreds of years are likely sites of future major earthquakes or rapid seismic creep. There will certainly be destructive earthquakes in the California region in the future, emphasizing the need for prudent examination of earthquake hazards and risks.

The offshore area of southern California south of the Channel islands is dominated by "basin and trough" topography and northwest trending fault scarps of high relief (Emery, 1960; Allen, et al. 1965). The location of earthquakes of magnitude greater than or equal to 4 which occurred in the offshore area of southern California during the time interval from 1932 - 1972 is shown in Figure 1. No obvious trends are conspicuous in the distribution of earthquake epicenters. Although the offshore region is not known to have been the site of a great earthquake (magnitude > 8) the historical record and the more recent instrumentally located epicenters show that earthquakes of at least magnitude 6 can be expected.

The existing distribution of seismograph stations in southern California does not allow precise epicenter locations offshore because of the azimuthal bias of land stations in California and the inadequate knowledge of crustal structure in the offshore region. Individual epicenters offshore are typically known to within only 15 km or so (a few larger events are located to within 5 km). Therefore, at present specific active faults in the offshore region cannot be recognized from the pattern and distribution of seismicity. It would be most useful and informative to accurately pinpoint active seismic zones in the offshore region. This could certainly be accomplished with several ocean-bottom seismometer installations, together with improvements in our knowledge of crustal structure.

Any ocean bottom pipeline offshore from California can be expected to cross faults and it would be important to map their locations by sub-bottom seismic profiling. Many faults in the region also have a topographic expression and the fact that fault scarps are preserved in



1932 THROUGH 1972, EVENTS EQUAL OR GREATER THAN MAGNITUDE-4

Figure 1. Map showing location of earthquake epicenters in southern California and offshore region (taken from Hileman, Allen and Nordquist. 1973).

relatively soft bottom sediments argues that relatively recent movement has occurred and can be expected to occur in the future.

GROUND MOTION AND FAILURE

Earthquake effects are related to magnitude - a measure of the energy released, and intensity - a measure of the severity of an earthquake at a particular location. Intensity in turn depends on the distance to the earthquake epicenter and local amplification effects produced by the thickness and physical properties of materials a few hundred feet beneath the site in question. The greatest amplitudes and the longest duration of motion are observed in thick water saturated unconsolidated materials. For example, studies have been made in the San Francisco bay muds (Borcherdt, 1969) which show that horizontal peak ground motion velocities are recorded with amplitudes 10 times greater than that observed on nearby bedrock areas.

Two areas of potential concern in offshore drilling operations are the rupture of pipelines carrying oil from the drilling platforms and damage of a drilling platform due to an earthquake. Because the presence of soft ocean bottom sediments could produce amplified shaking and possible liquefaction along any proposed underwater pipeline the distribution and thickness of unconsolidated sediments should be mapped and frequent core samples of these sediments taken to evaluate their response to seismic shaking.

An offshore drilling platform can be designed to meet a specified design load factor. For example, the drilling platforms in the Dos Cuadras offshore field in the Santa Barbara channel are designed for a seismic load factor of 0.15 times the acceleration of gravity g . However, it is fair to point out that the 1971 San Fernando shock of magnitude

6.6, only a moderate shock by seismological standards, produced the largest acceleration (0.5-1.5 g) ever recorded during an earthquake. Furthermore, Boore and Page (1972) have demonstrated that ground accelerations recorded within 10-15 km of faulting during moderate sized earthquakes have been significantly underestimated by some of the acceleration-distance relations commonly used in seismic engineering. Because strong shaking over a limited area can be extremely destructive, and because there is a lack of close-in ground acceleration data, the empirical relations in use for seismic design engineering may be inadequate to evaluate whether proper design considerations will be utilized for offshore platforms and pipelines. Some offshore platforms may have a resonant period of several seconds and long period ground motion effects have not been as carefully studied as shorter period motions.

One other mode of possible failure to ocean bottom pipelines needs to be mentioned - the possibility of damage from turbidity currents. Because we are dealing with a topographic region of basins 1/2 to 2 km deep separated by islands and banks, steep slopes can occur and turbidity currents could be generated that could possibly produce damage on ocean bottom installations.

TSUNAMIS

Tsunamis are unusually high sea waves triggered by earthquakes on or near the ocean floor or by large submarine landslides. They can be triggered by distant large magnitude earthquakes or locally by near earthquakes. Distant earthquakes have triggered tsunamis which have struck the California coastline (Tsunami hazards in California, map, California Div. of Mines and Geology, 1972).

Tsunamis have also been generated along the western coast of the

United States due to earthquakes in the Santa Barbara channel (Hamilton et al., 1969). In 1812 an earthquake near Santa Barbara purportedly triggered a tsunami with reported wave heights of 50 feet at Gaviota, 35 feet at Santa Barbara and 15 feet at Ventura (Wood and Heck, 1966, p. 18). The magnitude 7.5 shock of 1927 off Point Arguello produced waves over 6 feet high. The possibility of tsunami damage to offshore platforms cannot be completely discounted. The critical factors to be considered are the height and velocity of the resultant sea waves and the particular stage of development of drilling or development of the offshore well at the time a tsunami strikes.

REFERENCES

- Allen, C.R., P. St. Amand, C.F. Richter and J.M. Nordquist (1965) Relationship between seismicity and geologic structure in the Southern California region, Bull. Seism. Soc. Amer., 55, 753-797.
- Boore, D.M. and R.A. Page (1972) Accelerations near faulting in moderate sized earthquakes, U.S. Geological Survey, Open File Report.
- Borcherdt, R.D. (1970) Effects of local geology on ground motion near San Francisco bay, Bull. Seism. Soc. Amer., 60, 29-61.
- Bravinder, K.M. (1942) Los Angeles basin earthquake of October 21, 1941, and its effect on certain producing wells in Dominguez field, Los Angeles County, California, Bull. Amer. Assoc. Petroleum Geologists, 26, 338-399.
- Emery, K.O. (1960) The Sea Off Southern California, John Wiley and Sons, New York, 366p.
- Hamilton, R.M., R.F. Yerkes, R.D. Brown, Jr., R.O. Burford and J.M. DeNoyer (1969) Seismicity and associated effects, Santa Barbara region, in Geological Survey Prof. Paper 679.
- Hileman, J.A., C.R. Allen and J.M. Nordquist (1973) Seismicity of the southern California region 1 January 1932-31 December 1972, Seismological Laboratory, Calif. Inst. of Technology.
- Johnston, R.L. (1955) Earthquake damage to oil fields and to the Paloma cycling plant in the San Joaquin valley, in Earthquakes in Kern County, California during 1952, Bulletin 171, California Division of Mines, 221-226.

Kovach, R.L. (1974) Source mechanisms for Wilmington oil field, California, subsidence earthquakes, Bull. Seism. Soc. Amer., 64, 699-711.

Martner, S.T. (1948) The Dominguez Hills, California, earthquake of June 18, 1944, Bull. Seism. Soc. Amer., 38, 105-119.

Wood, H.O. and N.H. Heck, revised by R.A. Eppley (1966) Earthquake history of the United States -- Part II. Stronger earthquakes of California and western Nevada, U.S. Dept. of Commerce, Environmental Science Services Admin., Coast and Geodetic Survey; Supt. of Documents, Washington, D.C.

Yerkes, R.F. and R.O. Castle (1969) Surface deformation associated with oil and gas field operations in the United States; Int'l. Symposium on Land Subsidence, UNESCO, Tokyo, Sept.

Robert L. Kovach
Professor of Geophysics
Stanford University

MANPOWER AND MATERIAL SHORTAGES

Dr. L. L. Handy

Department of Petroleum Engineering
University of Southern California

MANPOWER REQUIREMENTS FOR OFFSHORE OPERATIONS

GENERAL

The rate at which offshore leases can be developed is dependent on many factors -- not the least of which are the availabilities of equipment, tubular goods, capital and qualified manpower. The objective of the proposed changes in the rate of leasing OCS acreage is to increase the rate of production of domestic oil and gas. A prudent policy would be to select those options in the use of these limited resources which maximize the rate of oil and gas production and minimize the time delay in obtaining increased producing capacity. Of these factors, availability of technically trained personnel is a particularly important consideration.

In recent years U.S. offshore operations have been limited to the Gulf Coast area. Engineers have been hired and trained for those domestic operations consistent with the existing requirements. It would have been unreasonable to have anticipated the developing of any substantial reserve pool of trained personnel for whom no need currently existed and conceivably would not develop in the near future without changes in state and national policy for offshore leasing. However, most of the oil companies which would participate in an accelerated offshore development program have been active, not only in the Gulf Coast area, but abroad where restrictions on offshore operations have been less severe than in the U.S. Engineers with experience in the Gulf Coast area and overseas can be transferred for operations elsewhere

when leases become available. A limited number of engineers with previous offshore experience are available in California. Many of the skills required offshore do not differ appreciably from those required in conventional onshore operations.

If the U.S. plans to supplant a significant portion of the imported oil with domestic oil produced offshore, a timely decision must be made with respect to offshore leasing to permit the universities and industry to recruit and train personnel so that they will be available as required for the expanded offshore activity.

Particular attention must be given to finding qualified scientists and engineers to staff the agencies responsible for administering and monitoring offshore operations. Policies must be established within these agencies for training those currently employed and for recruiting high caliber personnel. The recommendations for meeting these requirements should be included in the EIS.

FACTORS AFFECTING MANPOWER AVAILABILITY

Effect of Leasing Policy

The requirements for technical manpower do not depend only on the rate of leasing but also on the policies with respect to the specific acreage proposed for leasing. On the one extreme, if the proposed acreage is primarily frontier acreage, the technical skills required initially will be strongly oriented towards exploration personnel such as geologists and geophysicists. Drilling will be from floating vessels with exploratory objectives. The requirements for drilling and production engineers will not be established until the success of the exploration program has been determined. On the other hand, if the additional acreage is primarily drainage acreage, the initial requirement will be for engineers to design and construct offshore platforms and production facilities. Later drilling, production and reservoir engineers will be required. The numbers of engineers required for these operations could be estimated reasonably well. Currently, the latter operations would be more limited by equipment than personnel availability. Recent changes in the economy, however, may result in steel goods being more accessible.

To minimize the environmental impact on coastal zones, the suggestion has been made that preference should be given to leasing tracts farther offshore over those near shore. This has been suggested, in particular, with respect to leasing off the California coast. Whether near shore or far offshore operations are preferred, the engineering skills for operating in deep waters and at long distances

from shore will differ in many respects from those close to shore. In California many of the areas near the coast have already been explored in considerable detail and plans for developing the fields are well advanced, including the formation of nucleus engineering groups to operate the fields if operations should proceed. On the Atlantic coast all offshore areas are considered frontier areas.

Rate of Developing Leased Acreage

The Environmental Impact Statement discusses insufficiently the basis for selecting 10 million acres as the amount of acreage to be leased in 1975 except to note the additional daily production to be anticipated from the lease sale in various areas. These additions to our producing capacity would certainly be highly desirable. The predictions show a non-linear relation between acreage leased and increased production, higher increments in leased acreage resulting in smaller increments of production. This is presumably because the better acreage would be leased first. No consideration is given in these estimates of other limitations on industry in effectively developing larger acreage allotments. In an appendix a summary is given of answers from respondents who were asked to estimate the time from leasing to first production and to peak production from various areas. These estimates do list factors which would affect the rate of developing leased acreage. Items most often mentioned are rigs, tubular goods, platforms and (less frequently) personnel. The effect of the total acreage leased appears not to have been considered, however. The critical question remains, then, how rapidly can industry find the equipment, capital and manpower to develop the offered acreage?

Congress, in authorizing funds for the EIS, specified that before leases are made the industry must establish that it has the equipment and other requirements to proceed with development of the leases at a satisfactory rate. A satisfactory rate of development has not been defined. The Western Oil and Gas Association has indicated in its study of offshore leasing for California that leases awarded in 1975 would not be productive until 1979. Production is estimated at only 67,000 barrels per day in 1980 and rising to between 700,000 to 1,000,000 barrels per day in 1990. These estimates are based on leasing 1.6 million acres. The estimates in the EIS for a similar area are three years to first production and eight years to peak production. This schedule of development would not appear to place any severe demands on the availability of manpower. The WOGA estimate is based on a one-time lease sale as proposed by BLM in July, 1974.

In this connection, it should be noted that the EIS does not propose a rate of leasing of 10 million acres per year. It proposes only that 10 million acres be leased in 1975. The Presidential directive states that in later years the amount of acreage to be leased will be based on market needs and on industry's performance record in exploring and developing leases. With these limitations, lack of diligence in the developing of leases for whatever reasons -- manpower or other -- would appear to be cause for limiting acreage offered for lease in subsequent years. Nevertheless, a more comprehensive study is required to determine what factors, other than acreage offered for lease, limit the development of increased offshore production. In recent years, however, the limiting factor has indeed been the rate of offshore leasing.

Competing Demands for Qualified Personnel

As noted earlier, a number of engineers, qualified for offshore operations, are currently assigned overseas. These people could form a nucleus for developing engineering staffs to supervise domestic offshore operations. To what extent this is possible is not known. Companies operating offshore in their foreign operations have made commitments which they must honor. They cannot indiscriminately remove engineers for use in U.S. offshore operations. In some areas such as Indonesia, technology is not well-developed and these countries rely heavily on U.S. trained personnel. In the absence of adequate supplies of domestic oil, we have relied heavily on them for crude imports as to Japan and other countries. In areas such as the North Sea, the leasing countries have made substantial progress in training their own engineers. Engineers with valuable experience may be available from these operations.

Within the U.S., secondary and tertiary oil recovery operations compete for certain classifications of engineers which are required for offshore operations. In general, tertiary recovery operations are more labor intensive per barrel of additional oil recovered than are operations in new reservoirs. Therefore, if one were faced with a choice in assigning personnel, maximum return in increased daily rate of oil production would be obtained in assigning engineers to offshore operations rather than secondary or tertiary recovery projects.

To some extent the same choices arise for other alternative fossil fuel sources. In general, developing new oil reservoirs gives maximum return in oil production capacity per unit of engineering time.

Similar considerations apply to onshore versus offshore exploration. Since the largest unexplored sedimentary deposits are offshore, chances of success are greater there than onshore. Most effective use of exploration talent would be in offshore operations if the objective is to maximize oil and gas discoveries with a given amount of scientific talent.

If shortages of technically trained manpower become critical in developing domestic fuel sources, consideration becomes essential of those alternatives which make most effective use of the talent available. Although the rate at which students are entering the engineering profession shows promise of increasing, significant shortages currently exist in the supply of petroleum engineers and may develop in other energy related fields. In any case, effective use of scientific and engineering manpower should be considered in developing a national energy policy. It should most certainly be considered in the alternatives discussed in environmental impact statements relating to energy.

Manpower Needs for Regulatory Agencies

An accelerated leasing program will make new demands for technically trained personnel for the regulatory agencies of both the federal and state governments. It will present substantial challenges to the USGS, BLM and other federal government agencies charged with the responsibility for administering the program and monitoring the offshore operations. Engineering and scientific talent will be required in federal agencies to provide resource assessment, supervise lease sales, monitor exploration and development activities and inspect

production operations. For these activities a wide range of technical talent will be required, including most scientific and engineering disciplines.

Of particular importance is the greatly increased geographic area to be included in the expanded lease sale. Offices for the BLM have been established in the areas for which leases are contemplated. The USGS is in the position of anticipating supervisory responsibility if the leasing program is approved but is only partially staffed for the increased work load.

The EIS does not make it clear what additional staffing has already occurred in these agencies or what additions to the staff are contemplated. The public must rely on these agencies to protect its interest. A high level of public confidence that they are carrying out their responsibilities effectively would insure more support for the offshore leasing program. For that reason the agencies must attract first class scientists, engineers and other personnel to accomplish this objective. To do so, they must compete with industry. The positions should be financially attractive enough to do so effectively. In addition training programs should be instituted to keep present personnel current on developments in engineering and technology. The efforts presently underway to accomplish these objectives, if any, should be discussed in the EIS.

Personnel for Emergency Operations

Qualified emergency personnel must be available to prevent spills or, failing that, to contain the spills with minimum damage. Standard procedures have been developed for the more common emergencies.

The skills required for these procedures are specialized but can be taught in a short time if qualified personnel and equipment are available.

The industry has instituted short courses for drillers to train them in emergency measures for controlling well fluids. This course is currently being offered in LSU and will shortly be given at the University of Oklahoma. A similar course is being considered for California.

Special cleanup vessels designed to recover oil spilled on the surface are operational in California and the Gulf Coast. Any extension of offshore operations will require developing similar capabilities in those new areas. The number of persons required for these operations is not large, but it is essential that this equipment be available wherever oil spills could occur. This would include tanker operations in and out of harbors. Availability of this equipment should not impose a restriction on increased leasing of acreage in 1975.

SUMMARY

1. This Environmental Impact Statement is with regard to a proposal to increase leased acreage to 10 million acres in 1975. The proposal is not for an annual leasing rate of 10 million acres per year. Personnel limitations would not place serious restrictions on the development of the acreage proposed for offering in 1975, but experienced engineers would likely have to be transferred from the Gulf Coast and overseas.
2. For many reasons, including limitations in manpower availability, the industry probably could not sustain an annual rate of leasing of 10 million acres per year and still develop the acreage at a satisfactory rate. This depends, however, on the success in discovering new oil and gas reserves. It should be noted, also, that the proposal does not state what a satisfactory rate of development would be.
3. Types of technical manpower required and the times at which the various skills would be needed depend on the mix of acreage placed for lease.
4. The most critical manpower requirements are likely to occur in the abrupt increases in the staffs required for BLM, USGS and other federal government agencies. Every effort should be made to attract highly qualified personnel to these agencies.
5. In competition with other domestic fossil fuel sources, offshore oil fields promise to provide the largest increment in oil and gas production for the least number of technical personnel.

6. Emergency personnel are available in some areas now. Training additional personnel for this purpose does not appear to be a limiting factor in the accelerated leasing proposal.

A Critique of the Lack of Consideration of Enhanced Recovery

Within the Draft Environmental Statement

for the Proposed Increase in Acreage to be Offered

for Oil and Gas Leasing on the Outer Continental Shelf

Richard L. Perrine

January 23, 1975

AB 1949, California State University, San Jose

MS 1950, PhD 1953, Stanford University

Professor of Engineering and Applied Science

Chairman, Environmental Science and Engineering

University of California, Los Angeles

The Federal Government has proposed that through accelerated leasing an extensive program be mounted to quickly drill and produce new oil from unexploited OCS regions. It has long been known that vast quantities of oil are unrecovered from reservoirs even after primary and the most common secondary recovery operations are complete.

The current importance of this potential alternative source is recognized by articles such as "Improved Oil Recovery Could Help Ease Energy Shortage" by Ted M. Geffen (World Oil, page 84, October 1973), and the fact that the Federal Energy Administration hosted a December 1974 symposium in Washington, D.C. to examine possibilities for enhancement of recovery. Another measure is current titles in the petroleum engineering literature. The December 1974 Journal of Petroleum Technology contains an unusually rich lode: "The Use of Numerical Simulation to Design a Carbon Dioxide Miscible Displacement Project," "Alkaline Waterflooding for Wettability Alteration -- Evaluation of a Potential Field Application," "A Caustic Waterflooding Process for Heavy Oils," "Field Trial of Caustic Flooding Process," Oil Recovery by Alkaline Waterflooding," "Mechanisms of Oil Displacement by Carbon Dioxide," and "The Sloss COFCAW Project -- Further Evaluation of Performance During and After Air Injection." The fact that this is an "Ancient" area -- long known but always targetted for consideration at some future date -- is shown by the long established literature. (Examples are Fayers and Perrine, "Mathematical Description of Detergent Flooding in Oil Reservoirs, AIME Transactions 216, p. 277, 1959, and Perrine, "Stability Theory and Its Use to Optimize Solvent Recovery of Oil," Society of Petroleum Engineers Journal, p. 9, March 1961.)

Thus a reasonable alternative to the proposed accelerated leasing program would be a less-accelerated offshore program combined with a substantially greater effort toward enhanced recovery from known reservoirs. By some criteria there might appear to be no advantage to this approach, but by others there are several possible important advantages.

As noted by Geffen, there are up to 50 to 60 billion barrels of already discovered oil as the potential resource. It is recoverable over the same time frame as in current OCS proposals. For much of this resource, each year of delay in attempts at recovery will mean abandonment of wells and other investments already made. Costs then are increased to such an extent that some oil becomes irretrievable. With enhanced recovery, no new environmental concerns are involved.

Cost-benefit evaluation from the internal cost standpoint of an oil company likely will place such methods at a disadvantage compared with new OCS oil. New oil comes at an acceptably low initial cost to the company. It increases the store of goods to dispense to the public at a profit over future years. There is no such benefit in dispensing with a private resource now which could be held for the future at perhaps negligible cost, and sold at the then current higher price.

But from the public viewpoint a different evaluation might follow. This alternative viewpoint would appear more appropriate in an Environmental Statement concerning a public resource. The fact that total loss of a part of the resource might be avoided would become an essential factor. A significant part of the alternative oil recovery effort could use different labor and technology, possibly creating a larger number of new jobs and with fewer possible bottlenecks.

In summary, the natural pace at which the petroleum industry seeks to utilize enhanced recovery is likely to be less rapid than would be desirable from a public policy viewpoint. Private commitments to such activities may be made only after all financial risk has disappeared. By way of contrast, it is characteristic of more entrepreneurial operations such as exploitation of new OCS regions that the difficulties tend to be underestimated. Some of the relatively untried methods for drilling and production operations proposed for Southern California in the Western Oil and Gas Association "Environmental Assessment Study" (October 1974) illustrate this optimistic point of view.

Federal environmental impact studies should provide an unbiased evaluation of each alternative. This certainly would appear to include careful re-evaluation of significantly increased use of enhanced recovery.

COMMENTS BY R. C. SHARP ON DRAFT ENVIRONMENTAL STATEMENT NO. 74-90

HEARINGS HELD BY BUREAU OF LAND MANAGEMENT - BEVERLY HILLS, CA.

FEBRUARY 6-8, 1975

Assistant Secretary Hughes, and Ladies and Gentlemen:

My name is Robert Sharp. I am appearing today as a member of the Scientific Advisory Committee of the Southern California Coalition of local governments. I am a graduate of the Stanford University Engineering School, and have thirty years of experience in the business of drilling oilwells, both onshore and offshore. Before my retirement I was Vice President of a drilling contracting company that drilled many of the offshore wells in the Santa Barbara Channel. Since 1969 I have served as an engineering consultant to the State of California and the City and County of Santa Barbara in matters pertaining to offshore oilwell drilling.

I am aware that this Environmental Statement prepared by the Bureau of Land Management is a draft statement and that a final statement must be prepared before actual leasing will be authorized. But, I am also aware that based upon past personal experience with other Environmental Statements

prepared by the Department of Interior, the draft statement usually sets the tone for all subsequent statements. This is because the final statements are prepared by the same departments, using the same people and the same research material. Even more important, the same basic concepts contained in the draft reports have been included in the final reports. I intend to address myself to the errors in these basic concepts.

As a drilling engineer, I also hope to point out a number of serious technical errors in this report. Finally, I will offer two positive suggestions to make offshore drilling less hazardous to our fragile coastal environment.

On May 20, 1974, the Department of Interior published a notice in the Federal Register which said in part: "The Bureau of Land Management will prepare an environmental statement which in general, will describe the following topics:..." One of the topics listed was, quote: "...the technology for developing oil and gas offshore." How well has the Bureau performed this task? In relation to technology, not well at all.

But before pursuing that question it is important to put several basic factors into a proper perspective. Why are the citizens of Southern California so concerned about oil drilling in the waters offshore? Why are our Governor, our two Senators, the mayor of Los Angeles, and countless other concerned public servants and citizens so concerned?

February 7, 1975

Basically, it is because they fear that a massive oil spill will foul their beaches - as happened in Santa Barbara. And we from Santa Barbara know that it can happen.

Hence, I strongly believe that the most important subject to be considered in any environmental statement concerned with offshore drilling, either in draft or final form, should be the prevention of oilwell blowouts. If we can prevent the blowout in the first place, we will not have to fear the tragic results of a massive oil spill.

And how adequately does this environmental statement 90-74 address this problem? I submit that it addresses this problem scarcely at all! The report itself contains 1,400 pages. Less than 20 pages are devoted to detailed and specific drilling and production operations. This is 1.4% of the total report. I believe that this almost total lack of concern for the most important cause of pollution reflects a lack of perspective on behalf of the Bureau. I would like to ask this question: Of all the people who had a part in the preparation of this report, how many have had actual experience in offshore drilling? And I wonder how many have been on an offshore drilling rig when the well started to "kick" and the blowout preventors had to be closed?

Another example of lack of perspective is shown by the table of references in this draft report. On pages 427 to 456 of Volume 2, the authors list 455 references which I assume were consulted. Of these 455 references only four are

February 7, 1975

in any way concerned with offshore drilling and production. It is also interesting to note that two of these four references, the National Aeronautics and Space Administration report of 1971 and the General Accounting Office Report of 1973, are critical of the Department of Interior's inspection and regulation of offshore drilling. Among the 455 references are included such subjects as: "The Migration of Whales in the Pacific and Bering Seas," and "The Status, Population, Dynamics, and Harvest of the Dusky Canadian Goose." I believe that whales are very important, and although I am not well acquainted with the Dusky Canadian Goose, I am sure that they are very important, too. All of our wildlife is important. But I submit that the whales and the Canadian Goose will not have to be subjected to an oil polluted ocean if we prevent the massive blowout before it happens.

Let's put first things first and have the environmental statement tell us how they propose to prevent blowouts from happening and fewer words telling us the results of the spilled oil. In effect they are assuming that it is necessary to pollute the ocean, an assumption that I refuse to make.

If the Bureau of Land Management does prepare a final EIS for Southern California offshore drilling, those of us who worked on the Union Oil Company lawsuit would be glad to submit literally hundreds of references that have to do specifically and in detail with blowout prevention. I would certainly include the 2,000 page so called "Red Book" prepared

February 7, 1975

by the Department of Interior U. S. Geological Survey (USGS) on the Santa Barbara blowout. This is one of the most important detailed studies yet made about blowouts. Further, I would suggest that you examine the hundreds of pages of sworn testimony taken under oath by the attorneys for both sides in this lawsuit. I believe that this testimony, particularly that of the drilling crews and Mr. Donald Solanas of the USGS will give you a new picture of what actually happened to cause the tragic blowout on Platform A, not what is in the rule books or in the press releases from Union Oil.

There is one other important fact which should be put into proper perspective. This fact is not even mentioned in this draft statement. The Outer Continental Shelf along the Pacific Coast is very different from that in the Gulf Coast or even in the proposed leasing area of the Atlantic. The Pacific OCS is different in that it is narrow and steep and drops off into deep water very rapidly. For instance, the massive steel platform to be erected by Exxon in the Santa Ynez field of the Santa Barbara Channel will be in water which is 850 feet deep. If this same platform were to be erected in the waters of the Gulf of Mexico, or in the Atlantic ocean off New England, it would probably be one hundred miles from shore. But in the Santa Barbara Channel it will be only five miles from shore. This is because the Pacific Coast Continental Shelf drops off into deep water so very fast. This is generally true along the entire Pacific Coast.

February 7, 1975

The difference in aesthetics is obvious. We in Santa Barbara have platforms literally in our "front yard" but most platforms in the Gulf or those considered for the Atlantic are not visible from shore because of the great distance. Even more important is the effect of this distance on containment and cleanup if there should be a blowout. The oil from an uncontrolled blowout can hit our beaches in hours whereas in the Gulf or the Atlantic it could be days or weeks. And the greater distance means more chance for containment and cleanup, inadequate as that may be. So the Pacific Coast is different, and the environmental statement should recognize this fact. It is also different in other respects, such as seismic hazards, tanker traffic, and economic impact. These subjects will be discussed by other speakers.

Because of this greater water depth off the Pacific Coast, most of the wells to be drilled offshore will have to be drilled from a floating vessel and produced by a subsea system. The oil industry is developing very complicated and exotic equipment for this deep water operation but most of it has not even been tested under actual operating conditions. I submit that the Pacific Coast is not the proper testing ground.

In a very few pages devoted to actual drilling operations, this report makes a number of very serious technical errors. I want to enumerate a few of these

errors because they indicate a complete lack of detailed knowledge of offshore drilling. For instance, under paragraph (3) on pages 33 and 34, Volume 1, when discussing exploratory drilling, it states that wildcat drilling from a jack-up platform is "basically the same" as drilling from a floating vessel. This is simply not true! The problems of safely drilling from any floating equipment, whether a drilling ship or a so-called semi-submersible, are much greater and much more hazardous than drilling from a stable and fixed platform such as a jack-up rig. This is because in addition to the usual hazards of oilwell drilling, you introduce the problem of the constant motion of the drilling vessel. Under storm conditions it often happens that this motion is so great that it is impossible to continue drilling.

You may recall that the disastrous Santa Barbara blowout from Platform A occurred at a time of a severe winter storm. I ask you to visualize what would have happened if this well had been drilled from a floating vessel rather than a fixed platform. With a combination of storm conditions, a blowout through the drill pipe, then dropping the drill pipe back into the hole, this blowout could well have taken 100 days to control rather than 10 days. In that case Santa Barbara beaches would have received 1,000,000 barrels of oil rather than 100,000. Not a pleasant thought!

The principal defense against oilwell blowouts either onshore or offshore, is a massive series of valves called blowout preventers. Whenever well conditions indicate a potential blowout, it is essential to immediately close these valves before performing the required remedial action. On land operations or on fixed platforms at sea, these valves are located just below the rig floor where they can be tested and visually checked at frequent intervals. However, on a floating drilling vessel these valves of necessity must be mounted on the sea floor, perhaps 1,000 feet below the vessel. I am sure that every drilling engineer with offshore experience will testify that this is much more complicated and much more dangerous. The authors who described blowout preventors in this report were obviously not drilling engineers for on page 35, Volume 1 they state, quote: "The blowout preventor stack usually is located on top of the drilling riser...." This statement is not only untrue, it indicates a complete lack of understanding of the basic function of blowout preventors. And since these preventors are so vital in the control of blowouts and its attendant pollution, I suggest to the Bureau of Land Management that they thoroughly check this vital subject with competent and experienced drilling personnel.

Thus far in my comments I have been critical of this environmental statement. I would like to conclude my remarks on a positive note and offer two definite suggestions

February 7, 1975

which I believe will make all offshore operations safer and hence less likely to pollute our oceans. Neither suggestion is earth-shaking in its concept but very important in its net result.

First, I suggest that the Department of the Interior demand that all oil companies operating in the outer continental shelf accept strict and unlimited and absolute liability for any and all damages resulting from their operations. Previous to the Santa Barbara spill it was possible to purchase insurance from the large underwriters for this potential damage. Not so today. If the risks are just too great for even Lloyds of London, they are too great for the citizens of Southern California! The insurance companies are in the business of insuring against all kinds of hazards and their refusal to cover offshore drilling is based upon actual experience and not upon the bland assurances of safety from the oil industry and the Department of Interior. This one requirement of automatic and unlimited and absolute liability would put the responsibility where it belongs and would go a long way toward forever preventing the types of corporate and government irresponsibility demonstrated in the case of the Santa Barbara blowout.

My final suggestion is one about which I feel very strongly. As a resident of Santa Barbara with some knowledge of oil drilling I have been asked to appear at many local, state, and federal hearings on offshore drilling. At every

February 7, 1975

hearing I have made this suggestion and almost everyone has said, "That is a great idea." My suggestion is this: All personnel engaged in offshore drilling and production operations shall be required to have adequate training and this training shall be verified by testing and a subsequent license issued by the USGS. Why is this so important? There have been many, many investigations made by government agencies, by the oil industry, and by outside experts as to the cause of blowouts. Without exception each of these investigations has come up with the same basic conclusion, namely: human error is the principal cause of oilwell blowouts. Based upon direct, personal knowledge I know this was true at Santa Barbara. It is obviously impossible to prevent all human error, but I submit that thorough training in the basic principles of blowout prevention as well as in the operation of the present day very complicated blowout prevention equipment, will go a long way toward preventing blowouts. This training must include not only the supervisory personnel but all members of the five man drilling crews. These are the men who must make the split second decisions that result in a controlled well or a blowout when a well starts to "kick." When this occurs there just is not time to call the office or to consult the rule book. I know because I have seen it happen.

And so, Mr. Hughes, I strongly urge your department to seriously consider: (1) requiring absolute liability by the oil companies for any and all damages resulting from

February 7, 1975

their offshore operations, and (2) requiring adequate training and licensing of all drilling personnel. In a personal interview with three of us from Santa Barbara on November 19th of last year, Secretary Morton endorsed both of these concepts. It is my understanding that Senator Cranston and Congressman Lagomarsino will soon introduce legislation to implement both of these important changes. I earnestly solicit your support for this new legislation.

And finally and most important, under the basic rule of the environmental hearing process, the concerned citizens of Southern California have the right to examine and comment upon a complete and adequate environmental report for the proposed offshore leasing. This report does not give us that right, for it is incomplete and wholly inadequate.

SECTION III

THE SCIENTIFIC ADVISORY COMMITTEE ANALYSIS -- SAN DIEGO

TESTIMONY OF DR. RICHARD EMERSON, PROFESSOR OF ECONOMICS,
UNIVERSITY OF CALIFORNIA AT SAN DIEGO.

POTENTIAL ECONOMIC IMPACTS OF OFFSHORE DRILLING ON THE
CALIFORNIA COAST

The potential economic impacts of offshore drilling have been categorized according to the sector in the economy being affected. For this purpose, three primary sectors have been identified; business and industry, residents and property owners, and local government.

Business and industry. There are two primary ways in which business and industry can be affected by offshore drilling. The first effect is on industries servicing the oil drilling and pumping industry. Examples of such impacts are the required construction of the drilling facilities and related construction, the transportation industry (if the oil is transported out of the area), the subsequent creation of refining industries, and so forth. The second type of impact will come through industries not directly related to the oil industry, but affected through external factors. Examples of this type of impact are tourism and water related recreation as it may be affected by the existence of oil drilling platforms and increased oil seepage into the water, impacts on the fishing industry due to changes in the marine ecology and oil seepage, and so forth.

An analysis of the industry impacts should attempt to identify all potential or projected effects of both types. Where industry is unique or particularly important in the region under consideration, special attention should be paid to the impacts on that industry. In San Diego, for example, tourism is an important industry and consequently any proposal for offshore drilling in San Diego should include a careful and extensive analysis of tourism in particular, and the above mentioned industries in general.

Coastal residents and property owners. This is the second major sector which is likely to be affected by offshore drilling. The effects on coastal residents and property owners come through several sources. There are likely to be changes in coastal prices due to the offshore drilling. Examples of changes which might be anticipated are reductions in property values, possible changes in transportation prices, etc.

A second effect comes through the change in the tax burden brought about by the demand for government services and capital. If this local government expense differs from the tax revenues generated by the industry itself or related industries mentioned above, then the tax bill of local residents is likely to change.

A third effect is aesthetic. Contrary to popular belief, there are "reasonable" ways of quantifying the aesthetic effects from an economic point of view. For example, the monetary value of a "good view" is often determined by examining the market prices of identical housing units both with and without views. The difference in values are often taken to be the value placed on the aesthetic pleasure generated by the view. There are, of course, many alternative means of quantifying such aesthetic effects.

A fourth effect would be those impacts related to the industry changes mentioned in the preceding section. These effects would generally be referred to as indirect effects on coastal residents in that they are impacts coming through changes in industries related to offshore drilling. For example, the change in the entire industry mix and employment levels brought about by the existence of offshore drilling may in turn affect population levels, unemployment, incomes and wages, and so forth. Each of these changes may have an effect on local residents and property owners.

Lastly, one cannot ignore the general sociological and demographic effects. The composition of the labor force is very likely to be affected by the existence of the major offshore drilling industry. Additionally, there may be changes in the age structure of the local area, crime rates, health-related statistics, and so forth. The most important of these effects should be carefully identified and the impact predicted.

Local government. The last major sector affected by offshore drilling is local government. In general, the local government will be affected not only by the offshore drilling itself, but also through the changes alluded to in both of the preceding sections. The impacts on local government will be primarily of two types. The first is the impact on the demand for government provided capital and services. Inspection and policing costs of the local government may rise, the requirement for utilities and other capital may increase, and so forth.

A second effect would be the impact on local government budgets. If the offshore drilling industry "more than pays for itself" in that it generates more revenues than expenditures on the part of local governments, then the local government budgets would be favorably impacted. If the converse is true (expenditures exceed the generation of revenues), then the budgets would be adversely affected. Such effects should be identified as accurately as possible prior to the decision for or against offshore drilling.

Summary. Before discussing briefly the way in which these effects might be approached and some important considerations in examining the above mentioned effects, an outline of the major potential impacts is presented in summary.

I. Effects on Business and Industry

- A. Construction of drilling industry facilities, housing, etc.
- B. Refining, transportation, other oil-servicing industries
- C. Industries "externally" affected
 - 1. Tourism and water related recreation
 - 2. Fishing and other water related production
 - 3. Other industries affected by environmental changes.

II. Effects on Coastal Residents and Property Owners

- A. Property value changes and other price effects
- B. Tax effects
- C. Aesthetic and other non-pecuniary effects
- D. Effects related to I. above
 - 1. Population effects
 - 2. Employment effects
 - 3. Income and wage effects
- E. General sociological and demographic effects

III. Effects on Local Governments

- A. Inspection, policing and other services
- B. Utility and other capital requirements
- C. Impact on budgets
- D. General political effects
- E. Indirect effects through I and II above

Suggestions for an economic impact analysis. Some brief comments relating to economic impact analysis for offshore drilling are presented below. An economic analysis of offshore drilling should include the following considerations.

In any economic impact analysis, the relationship among all of the above effects should not be ignored. For example, the aesthetic effects may not be related only to the drilling and pumping operations, but could be related to environmental changes brought about by other industries affected as outlined in section I of the summary. Another example: the tax effects listed in section III above may come through the drilling operations themselves and through the subsequent property value changes mentioned in II above. There are, of course, many other such interrelationships which should be examined, but they are too numerous to include in this discussion. An extensive economic impact analysis should include as many of the direct and indirect impacts as possible. The two examples cited in this paragraph are examples of indirect impacts.

A second important point is that the potential effects listed above may depend on things occurring outside of the coastal region being considered. For example, the direct and indirect impacts of offshore drilling on the unemployment levels in the region may depend on the state and national economy. Such considerations should be included in an economic impact analysis.

One commonly utilized approach to economic impact analysis is a complete cost benefit analysis of the proposed industry. A thorough cost benefit analysis would determine all of the direct and indirect benefits from having offshore drilling on the California coast. The direct and

indirect costs (or adverse effects) would be identified as well. An important aspect of the costs associated with any industry would be the foregone benefits which would have been obtained by the best alternative to offshore drilling. Such alternatives may include other forms of fossil or other organic energy sources, solar energy, geothermal energy, and so forth.

If an economic impact analysis is carried out to identify the net benefits to the nation of having offshore drilling on the California coast, an important secondary consideration is to identify the net benefits to the California coastal region alone. For example, if a cost benefit analysis happened to show that the net benefits to the nation as a whole are positive and the decision to develop an offshore drilling industry is made, it is very likely that the net benefits to California would be negative. California would bear the bulk of the costs, while the nation as a whole obtains the benefits. In this event, it would be highly desirable to investigate procedures for appropriately compensating those individuals bearing the costs of having offshore drilling. Such compensation should not be limited to direct monetary transfers but could also take other forms such as compensation in kind (e.g., open space), tax relief, etc.

TESTIMONY OF DR. GERHARD WOLTER, PROFESSOR OF PHYSICS,
SAN DIEGO STATE UNIVERSITY, SAN DIEGO, CALIFORNIA.

"If a new Idea were to be admitted only when it had definitely proved its justification or even if we merely demanded that it must have a clear and definite meaning at the outset, then such a demand might gravely hamper the progress of science. The Idea of Perpetual Motion gave rise to an intelligent comprehension of Energy; the Idea of the absolute velocity of the earth gave rise to the Theory of Relativity; and the Idea that the electronic movement resembled that of the planets was the origin of Atomic Physics. These are indisputable facts, and they give rise to thought, for they show clearly that in science or elsewhere fortune favors the brave."

Max Plank

(Quote in English found in American Journal of Physics,
Volume 43/1, Jan. 1975)

In the USA, we have a preoccupation with technologies which can be applied directly without too much investment promising a nice monetary return. Anything requiring a long term investment has rarely received massive monetary backup when the promise, "You may strike it rich," was doubtful. Since this approach has worked quite well, we may have become blinded to a point that we no longer can see long range implications of what we are doing to ourselves and our environment. Pollution of our air and our rivers, and even our coastal oceans are eloquent demonstrations that the economic outlook did not foresee the disasters. The recent shortages in the energy sector: Electricity (brownout, blackouts), gasoline and oil shortages, and natural gas shortages on the horizon, raise serious questions as to the efficacy of our planning in the past. Scientists have been predicting energy shortages since 1925. But we always found new oil in the USA and even more abroad. When I testified between 1947 up to 1952 about the energy situation in Germany during World War II, I was listened to politely, but at the end of my discourses received basically the same comment: "We can get a barrel of oil from the Mid East for about \$1.90 fob." This was followed by the question: "Could you make oil with your process for one half the price?" My answer was "no" and that was the end of our meetings. Today, the economics of the situation are different. Today the questions being asked are different too. The country wants to know why was our

national energy system managed in the way it was. How could the USA, with enormous coal reserves within her own boundaries, fall prey to the conversion of all modern power plants for either oil or natural gas firing without developing an adequate synthetic oil or gas backup system? Industrial research was not a domain of the university, and apparently both the government and the universities have failed to provide an appropriate answer to our energy crisis. If it were otherwise, why do we have one?

How could we be so naive as to switch our steamboilers in our power plants from coal to oil firing or natural gas? Why haven't we tried a bit harder to remove the SO₂ from the stacks; we were told it was not economical. Today we pay for this blunder with an ever-increasing imbalance of payments for huge oil imports which we no longer can control. We had coal-gassification plants in the USA before 1930.

The economic question as viewed through technologically trained eyes is a complex issue. There are questions about work ethics, strikes, financial planning, profit margins and investment returns, real estate investment, taxes paid here and abroad, faulty equipment deliveries, fair and decent workmen compensation or strikes (and more recently air pollution and environmental protection). Every one of these factors is a very complex issue in itself, and it has been much easier to avoid the knotty issues by simply pumping oil from the ground, with natural gas coming free for many years when there was plenty of oil and gas.

After many years travelling comfortably on this road, always in fair weather, a few years ago dark clouds appeared on the sky. We continued to travel, happily building bigger and fatter cars, lowering the mileage from 18 mi/gal city driving, and 25 mi/gal freeway in the 1950 models to 9 mi/gal and 12.8 mi/gal Chrysler 1968, etc., etc. Thus we blundered into our present energy crisis situation.

. Now we have to face facts and are painfully reminded that the joy-ride with energy is over. But instead of developing a National Energy Policy, we quickly plunge headlong into new adventures, i.e., offshore oil drilling, shale extraction processes, building huge tankers, any one an excellent target for nuclear torpedo delivered by a submarine or a target-seeking missile. Haven't we learned anything from the last Israel-Egyptian War? If you can hit a patrol boat by rockets, what chance does a tanker have? We want to build huge transportation tankers for liquified Methane gas which will be transported to our shores instead of the Methane gas being flared off; technologically speaking a wonderful idea. But a simple handgrenade can turn this energy dream into an inferno. Are we still so naive after hi-jackings and bombings in our country, that the possibility of the destruction of energy sources is viewed as only material for science fiction TV dramas?

Our responses today, and in the next year or two years, will substantially influence the fate of the USA not only energy-wise but also in the total style of living.

Stop-gaps in gasoline and natural gas have been predicted for many years. I personally have been on record since 1947 when I submitted my first documents (in English) to the FIAT Commission, and since 1950 here in the USA at a time when most Americans believed that supplies were infinite. Even geology professors told me that the rate of discovery of new oil wells would increase substantially in a few years with new methods of drilling and pinpointing where to drill successfully. Today the oil people tell us that drilling becomes more and more costly because we have to go deeper and deeper.

Our hopes for cheap oil are shattered. This mighty nation no longer controls the oil policies of the weaker nations. Even the delivery of many raw materials, other than oil, has become a delicate political issue. Small nations willing to sell for a few dollars mountains of ore, demand stiffer and stiffer taxes on exports, or cancel existing contracts by nationalization of mines. These nations no longer deliver their raw materials at our advantage, they demand what they view to be their rightful share. The disclosures in the press have left little doubt where we stand: The USA depends on the use of prodigious amounts of energy for our standard of living, and a very large chunk of this energy comes over very thin and very vulnerable supply lines from abroad. Thus, we must develop our own sources of energy. In order to do so, we need a National Energy Policy.

In the short time left to us, we cannot hope to produce an ideal Energy Policy. It certainly need not be such a beautiful document as the Constitution or the Declaration of Independence. We should be much more humble, and should produce a tentative version ready for a revision after five to ten years, but we should have every option available for a test period of at least three years.

The National Energy Policy should be based on a thorough analysis of both the benefits and costs of all energy sources. For example, in an analysis of all the benefits and burdens associated with the extraction of oil from oil shale, much attention should be given to the problem of rocky debris which the extraction process produces. One single ton of crushed shale yields upon heating about 30 gallons of sulfur free oil. However, one ton of rocky debris results, which has to be disposed of. Thus, if we recovered a billion barrels of shale oil, we would have to dispose of a rock pile which, when spread out, would cover an area the size of Colorado with a 10 foot high layer of debris. The rocky layer would be absolutely sterile; nothing would grow in it or on it. Therefore, before we speak with enthusiasm of the enormous amount of oil contained in shale, we should realize that we need an enormous amount of energy to produce it and to dispose of the spent portion.

Thus, in studying the production of oil from oil shale, in preparation for the promulgation of a National Energy Policy,

we should find out exactly how much energy is needed to produce oil in this manner, and how much it costs to dispose of the inevitable debris.

Before we can have an integrated energy policy, we need factual data about many factors which are available only in very sketchy terms.

In order to devise a sound National Energy Policy, we need an assessment of all costs hidden behind tax-shelter provisions, etc., and the total cost of all fuels including all processing costs, transportation charges, etc. This also includes availability of localized energy sources and transformation of such fuels into modes of delivery other than by truck or railway. In short, we have to consider more, much more than we have considered in the past in our quest for an inexpensive solution. Opening up new employment for people out of work has to be considered too. The economic impact of a new technology, providing a surge in employment is worth more than a refined technology which gives economic pleasure to a few but leaves millions of unemployed in the streets. Another matter which should be considered as part of the study needed prior to formulation of a National Energy Policy is the use made of natural gas. It appears to me that we should not use natural gas to raise steam in our boilers. If we use gas, it should go into gas turbines, and perhaps into magnetohydrodynamic converters. We are talking here about total energy extraction from the fuel. Today, in medium-sized boiler plants, we achieve 35% efficiencies, in larger

plants we come close to 40%. Efficiencies of large-scale gas turbines about 40%, and in MHD conversions we should be able to achieve better than 50% conversion efficiency.

Typical nuclear reactor efficiencies are about 30%.

I cannot discuss all the alternate energy sources which should be analyzed prior to development of a National Energy Policy, due to time constraints at this hearing. Therefore, my focus is on methanol and methane production. I know methanol is a viable alternate source of energy because I supervised operating methanol plants in Germany during the last World War.

Turning to methanol first, this substance can be used as an additive to gasoline to stretch mileage. Combining this with production of cars with better mileage (less dead weight), we would have something tangible which could ease the balance of payments on a very short term basis. Let me emphasize that I am not talking about 100% replacement of gasoline; this requires a different kind of motor. Pure methanol is the first step as an additive. We have other methanol mixtures with higher alcohols (in specified %) which give even better driving abilities. This kind of research should not be left in the hands of the gasoline industry; results should be verified by independent research facilities, not under contract of oil companies.

Immediate start of methanol production on a large scale will ease the balance of payments considerably since it will reduce the need for imports. Further, it may obviate the need for off shore drilling.

A plant which produces methanol can also produce methane gas which can go into existing pipelines and can be mixed with natural gas to help stretch a dwindling supply.

That same plant which produces methanol and methane gas could also produce a crude oil.

All these products would be produced from refuse, or coal, or many other materials.

From past experience in the City of St. Louis, we can assume that a city of similar size produces about 300 tons waste products which can be either burnt or into a pyrolysis process. With simple pyrolysis and no sophisticated equipment we get about 150 to 180 barrels of crude oil, the rest producing some tar and charcoal-like substance which can be processed for barbecue briquets. With more sophisticated equipment, we can increase the yield in crude oil and may obtain methane gas in considerable amounts also. But now we are talking about a plant investment program of about \$9 million, the size of the Garret plant design in El Cajon near San Diego. Considerable more sophistication is necessary to produce methane, methanol and crude oil, with an option to steer the process in the direction of any given desired output with reasonable yield. The operating personnel can no longer be cheap labor, the work is now in the hands of computerized control supervised by chemical or petroleum engineers.

It is my understanding that we have about 20 different programs going supported by the government with an attempt

to learn more about waste management and to create something useful besides. But I see no evidence of any energy master plan. It seems to be a haphazard way of experimentation.

None of these processes, as far as I know, come close to what was done some 25 years ago. Why don't we make use of the enormous amount of research and operational experience which was in existence over a quarter of a century ago? What happened to all the FIAT reports taken in Germany after 1946/47? Were are they buried? In the time during 1950 and 1973, I have not seen an attempt to bring out a white book, a government sponsored compilation of all material available, published and unpublished.

The National Energy Policy must provide guidelines for efficient use of energy, and must provide motivation to avoid waste of energy. Controlling waste and conserving energy are closely knit together, and a special study group should be created to look into energy leak and loss. The days of free spending of energy are over. We must cut out all wasteful and frivolous energy usage.

In closing, as a scientist with 50 years experience in a wide range of energy matters, I urge you to begin a cost/benefit analysis of all energy sources available in America. That analysis can be the basis of a National Energy Policy which will prevent this nation from ever again being dependent on foreign energy producers.

TESTIMONY OF
DOCTOR RICHARD EPPLEY, BIOLOGIST
SCRIPPS INSTITUTE OF OCEANOGRAPHY
LA JOLLA, CALIFORNIA

1. In some respects the EIS does not appear to be responsive to the provisions of NEPA as interpreted by the Council on Environmental Quality (Fifth Annual Report CEQ Environmental Quality 1974, pp. 514-517).

a. Throughout the EIS lists of species of organisms, including species utilized commercially, are provided. However, there is no attempt to discuss their dynamic changes over time, their food sources in marine food webs, their interdependence upon other species, the relationships of population sizes or recruitment to planktonic or benthic production, their behavior, breeding, or reproductive cycles, migrations, spawning areas, etc., which would be required information for the assessment of potential impacts of the proposed action. The discussions appear superficial and inadequate for assessing (i) what impacts might be expected, and (ii) how impacts specific to this proposed action might be recognized and distinguished from other environmental impacts.

b. In the section on Unavoidable Adverse Environmental Impacts a few acute problems associated with drilling and oil spills are listed, but there is inadequate discussion of the impact of long-term chronic exposures resulting from many small releases of petroleum or its products. Particularly lacking is a discussion of how such impacts might be evaluated.

The EIS states (Vol. 2, p. 304), "The more subtle effects of light but repeated contamination may be serious also, but are not well understood at this time." This seems like a cop-out. Who is going to develop the needed understanding and when? Perhaps the need for knowledge wasn't so important between 1954 and 1973 when the lease rate of OCS for drilling was less than one million acres per year. But the sudden increase to ten million acres per year, and in frontier areas, represents an order of magnitude increase in environmental risk. I suspect that the needs for knowledge will totally overwhelm the small community of marine scientists available to study such problems.)

c. The EIS (Vol. 2, p. 332) claims that results of exploratory drilling will be required before potential environmental impacts can be adequately assessed. This, too, seems to be a cop-out and unresponsive to NEPA.

d. One gets the feeling from this EIS that BLM has no honest intention of seeking sufficient understanding of the marine environment to allow a full assessment of the impacts of its actions. The EIS (Vol. 2, p. 339) states, "A central feature of many of these studies is that they are never really completed in the sense that they rarely reach definite conclusions with wide applicability, but simply advance from one stage to another, from one level of analysis to another, thereby contributing to a growing area of knowledge and body of literature pertaining to the numerous complexities of environmental analysis. To delay the sale on the basis of

incompleted studies would require an indefinite delay of perhaps many years duration." Such an attitude is missing entirely from the discussion of the technology of winning oil.

2. The EIS does not cover all of the topics indicated in the notice published in the Federal Register, Vol. 39, No. 98, Monday, May 20, 1974. Missing are discussions of (a) the effect of the proposed action of the level of environmental study prior to leasing, (b) monitoring of actual and threatened effects of lease operations, and (c) the study programs for environmental baseline and monitoring studies. Note: My copy of the EIS is missing pages 126-141, Vol. 1, where these topics might have come up.

3. The EIS is inconsistent with statements in the Federal Register (cited above) to the effect that, "The Department has no intention of leasing anywhere on the OCS if it cannot be accomplished in an environmentally acceptable way." This statement is inconsistent with the EIS in which it is asserted repeatedly that potential impacts upon marine organisms cannot be quantitatively assessed or predicted at this time.

4. The EIS does not consider certain existing data nor the present impacts of oil operations in Southern California.

a. Present and future impacts of current refining, petroleum transport, spillage in harbors, natural seeps, and the like are not discussed for this region. Apparently there have been no attempts in the past to assess such impacts in

in Southern California, other than the Santa Barbara oil spill, nor is any future concern reflected in the EIS to assess impacts of existing petroleum operations.

b. The EIS displays no effort to consider the twenty years, or so, of historical data on fish catch, fish egg and larval abundance, or the records of fish abundance in the past as revealed by the preserved fish scales recovered from sediments of the Santa Barbara basin. These records provide a valuable and unique record of the recent past and a basis for future comparisons. Their omissions from the EIS denotes, to me, a lack of scholarship.

c. The EIS fails to discuss the impact of the proposed action upon the scientific research community. Rather, the BLM appears to assume that sufficient oceanographic talent exists for any needs that may arise. But have they evaluated the capacity of the federal, state and local scientific establishments to assess the impact of the proposed action? Has it occurred to the BLM that several other agencies are also calling upon the local scientific community to respond to their environmental problems as well? I seriously doubt that sufficient manpower now exists in certain fields, for example in marine ecology or physical oceanography, or can be trained by existing oceanographic institutions in time to respond to the needs for assessing the impacts of the proposed action.

d. The EIS briefly alludes to impacts of other human activity upon marine water quality in Southern California,

notably sewage disposal and electric power production. However, it does not consider what problems these activities now create for marine plankton or fisheries, nor what means are utilized for assessment of impact, nor whether these methods are adequate.

5. The EIS indicates that baseline and monitoring studies will be undertaken for regions of impact. But what are "baseline studies" and what is meant by "monitoring"? Will such studies provide understanding or are they only futile exercises carried out to placate our citizens. It seems clear from this EIS and from the recent National Academy of Science report, "Petroleum in the Marine Environment" that new OCS drilling will take place in near-total ignorance of its potential impacts on the quality of the marine environment of Southern California. It is not at all clear that this ignorance will be dispelled by BLM's proposed studies or by any short-term activities on its part. Is BLM willing to foster the development of the necessary science for assessing environmental impacts to the same degree that it, by such actions as that proposed, fosters the technology of drilling and pipeline construction? For example, what is BLM doing for the development of analytical techniques for petroleum constituents in sea water, for the development of concepts in marine ecology and fisheries dynamics, in marine geophysics? Has it considered the problems of training and developing the needed manpower, or in fact where such specialists come from?

6. I take specific issue with several points raised in the EIS.

a. The EIS claims that the most severe impacts of drilling activities on organisms result from oil spills. On the other hand, the National Academy report (cited earlier) cites the destruction of habitat associated with such operations as having the most severe environmental impact.

b. The EIS continually refers to past experience in the Gulf of Mexico, where off shore drilling has taken place many years, for assertions that impacts upon plankton and fisheries will be minimal and indeterminable. I claim that the marine environment off Southern California is so different from that of the Gulf that comparisons are not justified, at least not in the sense of providing assurance that impacts will be small.

c. The EIS (Vol. 1, p. 16) claims that the impact of spilled oil on phytoplankton is generally the same wherever it occurs, regardless of the species composition of the phytoplankton assemblage. I doubt this statement since recent work has shown a greater sensitivity of diatoms than other phytoplankton to some petroleum constituents. Diatoms are characteristic of upwelling areas, as off Southern California, but not the Louisiana coast. These diatoms seem to play a special role in marine food chains in upwelling areas, particularly those leading to fishes such as anchovies, sardines and herring.

d. On the same page the EIS asserts that, "What are important are the levels of primary production in different areas; reductions of these levels have more significance to ecosystem vitality than a description of species most affected." This is clearly not so as shown by recent studies of the phytoplankton species that can serve as food for larvae of anchovies in Southern California coastal waters. Here only a few species of dinoflagetates are satisfactory as food organisms for the fish larvae at that brief developmental stage in their life cycle when they feed upon phytoplankton.

APPENDIX

BIBLIOGRAPHY

Primary Sources

1. Ad Hoc Committee on Domestic and Internal Monetary Effect of Energy and Other Natural Resource Pricing of the Banking and Currency Committee of the House of Representatives, The Accelerated Development of the O.C.S.: Its Problems and Costs (December, 1974).
2. Ad Hoc Committee on the Domestic and International Monetary Effect of Energy and Other Natural Resource Pricing of the Committee on Banking and Currency of the House of Representatives, Oil Imports and Energy Security: An Analysis of the Current Situation and Future Prospects (September, 1974).
3. Ahern, William R., Federal Leasing of Areas Seaward of Los Angeles and Orange Counties For Oil and Gas Development; Major Implications, Rand Corporation.
4. Boesch, et.al., Oil Spills and the Marine Environment, papers prepared for the Energy Policy Project of the Ford Foundation.
5. California Attorney General's Office, Physical Assessment and Clean-Up Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to the 1969 Santa Barbara Oil Spill Incident (1974).
6. California Coastal Zone Conservation Committee, Energy Element (December 1974).
7. California Energy Planning Council, California Energy Outlook 1974-1975 (June 1, 1974).
8. Committee on Appropriations, Senate Hearings, Special Energy Research and Development Appropriations For Fiscal Year 1975 (January, 1975).
9. Committee on Commerce, of the Senate, Outer Continental Shelf Oil and Gas Development and the Coastal Zone, prepared at the request of Hon. Warren G. Magnuson, National Ocean Policy Study (November, 1974).

10. Committee on Commerce, of the Senate, Outer Continental Shelf Oil and Gas Leasing Off Southern California: Analysis of Issues, National Ocean Policy Study (November, 1974).
11. Committee on Interior and Insular Affairs, O.C.S. Oil and Gas Development (May, 1974).
12. Comptroller General of the United States, More Specific Policies and Procedures Needed for Determining Royalties on Oil From Leased Federal Lands (1972).
13. Council on Environmental Quality, Report on O.C.S. Development off Alaska Gulf and Atlantic States (April, 1974).
14. Doctor, Dr. R.D., Electricity Conservation; An Examination of Los Angeles Department of Water and Power Load Growth, presented to the capital Improvements Committee Los Angeles City Water and Power Commission (August 29, 1974).
15. Fay, R.C., Southern California's Deteriorating Marine Enviroment, Center for Calif. Pub. Affairs (1972).
16. Federal Energy Agency, Project Independence Blueprint (November, 1974).
17. Ford Foundation, A Time to Choose, Ballinger Publishing Co., Cambridge, Mass. (1974).
18. Gulf South Research Institute, Offshore Revenue Sharing: An Analysis of Offshore Operations on Coastal States, prepared for the Governor's Offshore Revenue Sharing Committee, Louisiana (1974).
19. Hoult, D.P., Oil on the Sea, Plenum Press. New York (1969).
20. Jones, George H., An Assembly of Pertinent Appraisal Data 1969 Santa Barbara Channel Oil Spill (1974).
21. Office of Information Services, Governor's Office, Austin, Texas, Benefits and Costs to State and Local Governments in Texas Resulting From Offshore Petroleum Leases on Federal Lands, prepared at the request of State Senator A.R. "Babe" Schwartz (November 14, 1974).
22. Nash, A.E. Keir, Mann, Dean E., Olsen, Phil G., Oil Pollution and the Public Interest: A Study of the Santa Barbara Oil Spill, Institute of Governmental Studies, Univ. of Calif., Berkeley (1972).

23. National Association of Counties, Newsletter No. 2; Oil Price Enforcement - Dollar Savings in Conservation (January 15, 1975).
24. National Science Foundation, An Economic Analysis of Alternative Outer Continental Shelf Petroleum Leasing Policies, prepared for the office of Energy R. & D. Policy (September, 1974).
25. The Rand Corporation, Electricity Conservation Measures in the Commerical Sector: The Los Angeles Experience, prepared for the Office of Conservation and Environment, Federal Energy Administration (1974).
26. The Radian Corporation, A Program to Investigate Various Factors in Refinery Siting, Texas (1974).
27. Southern California Law Review, A Decision-Making Process for the California Coastal Zone, 46 S. Cal. L. Rev. 513 (1973).
28. Steinhart, Carol E., and Steinhart, John E., Blowout, A Case Study of the Santa Barbara Oil Spill (1974).
29. Subcommittee on Activities of Regulatory Agencies, Energy Data Requirements of the Federal Government (1974).
30. Subcommittee on Immigration, Citizenship, and International Law Hearings, O.C.S. Oil and Gas (1974).
31. U.S. Dept. of Interior, 1974 O.C.S. Oil and Gas General Lease Sale Offshore Louisiana, Draft E.I.S. (1974).
32. U.S. Dept. of Interior, Proposed Increase in Acreage to Be Offered For Oil and Gas Leasing on the Outer Continental Shelf, Draft E.I.S. (1974).
33. U.S. Geological Survey, Federal Leases in Santa Barbara Channel, Draft E.I.S. (February 23, 1971).
34. Western Oil and Gas Association, Environmental Assessment Study of Proposed O.C.S. Leases (1974).
35. Williams, Dr. Harold M., Appraisal and Recommended Changes to the Emergency Energy Curtailment Plan City of Los Angeles (March 8, 1974).
36. Williams, Dr. Harold M., We Must Break the O.P.E.C. Cartel; A Response to President Ford's Energy Program, presented to the Federal Energy Administration (October 10, 1974).

37. Younger, Evelle, California Attorney General, Alternatives to Oil and Their Legal Implications (1974).

Secondary Sources

38. Ahern, Oil and the O.C.S. (1973).
39. Ahern, William, Letter from William Ahern to Mr. Peter Douglas, Consultant, Assembly Select Committee on Coastal Zone Resources, State Capitol, Sacramento, California (December 9, 1974).
40. Allen, D.R., P. St. Amand, C.F. Witcher, and J.M. Nordquist, Relationship Between Seismicity and Geologic Structure in the Southern California Region, Bull. Seis. Soc. Am. 5 (4:753-797) (1965).
41. Bravinder, K.M., Los Angeles Basin Earthquake of October 21, 1941 and Its Affect on Certain Producing Wells in Dominguez Field, Los Angeles County, California, Am. Assoc. Petr. Geol. Bull. 26(3): 388-399 (1942).
42. California Department of Water Resources, Crustal Strain and Fault Movement Investigations: Faults and Earthquake Epicenters in California, Calif. Dept. Water Res. Bull. 116-2/ (1964).
43. California Division of Mines, Offshore Geology and Oil Resources, California Div. Mine, Mine. Inform. Serv. 12(5): 1-7 (1959).
44. California Energy Planning Council, California Energy Outlook 1974 and 1975 (1975).
45. Clements, T., K.O. Emery, Seismic Activity and Topography of the Sea Floor off Southern California, Seis. Soc. Am. Bull. 37: 307-313 (1947).
46. Committee of Commerce, Oil and Gas Development and Coastal Zone Management, Serial Number 93-99 (1974).
47. Committee on Interior and Insular Affairs, United States Senate, Energy Supply Act, Working Paper (January, 1975).
48. Cory, Kenneth, A Report of the Joint Committee on Public Domain on Offshore Drilling, What's The Rush? (1974).

49. Cram, Future Petroleum Provinces of the U.S., Their Geology and Potential (1971).
50. Dole, S.H. and R.A. Papett, Environmental Factors in the Production and Use of Energy, Rand Corp., Santa Monica (1973).
51. Ebeling, A.W., W. Werner, F.A. Dewitt, Jr., G.M. Gailliet, Santa Barbara Oil Spill: Short Term Analysis of Macro-Plankton and Fish, E.P.A. 15980, E.A.L.O. 2/71, Univ. Calif., Santa Barbara (1971).
52. Farris, Brian W., Southern California Association of Governments, Suggested Policy Statements (December 12, 1974).
53. Final E.I.S. on O.C.S. Development for Mississippi, Alabama and Florida, FES 73-60 (1973).
54. Fisher, George P., Desulfurization, First Draft (May 30, 1974).
55. Foster, Michael S., The Santa Barbara Oil Spill: A Review of Damage to Marine Organisms, prepared for the Department of Justice.
56. Geophysical Services, Inc., Final Report - Seismic Survey of the Los Angeles Harbor, Los Angeles County, California, prepared for the City of Los Angeles (1962).
57. Higgins, Geology and Oil Fields of Coastal Areas, Ventura and Los Angeles Basins, California, Am Assoc. Petr. Geol. (1958)
58. Hileman, J.A., C.R. Allen and J.M. Nordquist, Seismicity of the Southern California Region, 1 January, 1932 to 31 December, 1972 (1973).
59. Los Angeles Area Chamber of Commerce, Water and Energy Committee Report (October 31, 1974).
60. Moran, D.M., J.E. Slosson, R.O. Stone and C.A. Yelverton (eds), Geology, Seismicity, and Environmental Impact, Assoc. Eng. Geol. Spec. Publ. (1973).
61. Morrison, Pacific Coast Geology (1972).
62. McKee, J.E., Oil Substances and Their Affects on the Beneficial Uses of Waters, Calif. State Water Poll. Control B.D. Publ. 16 (1956).

63. Morton, Rogers C.B., Rogers Morton: Offshore Oil is the Answer, Los Angeles Times (January 8, 1975).
64. Nicholson, N., The Santa Barbara Oil Spills in Perspective, Calif. Coop. Oceanic Fish. Invest. Rpt. 16: 130-149 (1972).
65. Nicholson, N.R.L. Cimber, "The Santa Barbara Oil Spills 1969: A Post Spill Survey of the Rocky Intertidal" in Biological and Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969-1970 Volume 1: Biology and Bacteriology, pp 325-399 (1971).
66. Offshore Oil Drilling Task Force, Los Angeles Area Chamber of Commerce, Committee Report to Board of Directors (1974).
67. People v Morton, Civil 74-2374-AAH, Exhibit X: Affidavit of Robert H. O'Brien.
68. People v Morton, Civil 74-2374-AAH, Exhibit J: Assembly Select Committee on Coastal Zone Resources, Hearing: Offshore Oil Drilling, Santa Monica, California (April 9, 1974).
69. Resources For Future, Inc., Towards Resolving Problems in O.C.S. Technology (March, 1974).
70. Sherman H. Clark Associates, The Need For Petroleum Supply From Southern California Federal Offshore Lands, prepared for Western Oil and Gas Association (September 27, 1974).
71. Stanford Research Institute, Meeting California's Energy Requirements, 1975 to 2000.
72. Straughan, D.A., "What Has Been the Effect of the Spill on the Ecology in the Santa Barbara Channel?" in Biological Oceanographical Survey of the Santa Barbara Channel Oil Spill, 1969 to 1970. Volume 1: Biology and Bacteriology, pp 401-426 (1971).
73. Text of International Convention for the Prevention of Pollution by Ships (1973).
74. URS Corporation, Marine Environmental Impact Assessment (1974).
75. URS Corporation, Physical Assessment and Clean-Up - Restoration Cost Estimate of Coastal Areas Contaminated by Material Related to 1969 Santa Barbara Spill, prepared for California Attorney General (1974).

76. URS Corporation, San Francisco Bay Area Experience, (1974).
77. U.S. Department of Commerce, California Drilling of Exploratory Wells in Santa Barbara Channel, Offshore California.
78. U.S. Department of the Interior, Letter From the United States Department of the Interior to Mr. Colman, Administrator, Environmental Development Agency, County of San Diego, California (January 15, 1975).
79. U.S. Department of the Interior, Regulations Pertaining to Mineral Leasing, Operations and Pipelines on the Outer Continental Shelf (May, 1973).
80. U.S. Department of the Interior, Bureau of Sport Fisheries and Wildlife, Southern California Estuaries and Coastal Wetlands. Endangered Environments. Portland, Ore. (1971).
81. U.S. Department of the Interior, Resumption of Drilling Operations in the South Elwood Offshore Oil Fields From Platform Holly, final E.I.S. prepared for the State Lands Commission.
82. U.S. Environmental Protection Agency, A Development Document for Effluent Limitations Guideline and New Source Performance Standards for the Petroleum Industry, Wash., D.C. (1974).
83. U.S. Geological Survey, Exploratory Drilling Operations on Federal O.C.S. Lands.
84. Water and Energy Committee, Los Angeles Area Chamber of Commerce, Water and Energy Committee Energy Policy, Revised (1974).
85. Western Oil and Gas Association, Statements Made By Seashore Environmental Alliance, and Comments Made By Western Oil and Gas Association (September 18, 1974).
86. Western Oil and Gas Association, West Coast Containment and Clean-Up Capability, prepared for the California State Lands Commission (1974).

U.C. BERKELEY LIBRARIES



C101742082